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CRPL-F 161 PART B

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PART B

SOLAR - GEOPHYSICAL DATA

ISSUED
JANUARY 1958

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
CENTRAL RADIO PROPAGATION LABORATORY
BOULDER, COLORADO

CRPL-F 161
PART B

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INTRODUCTION

This monthly report series is intended to keep research workers abreast of the major particulars of solar activity and the associated ionospheric, radio propagation and other geophysical effects. It is made possible through the cooperation of many observatories, laboratories and agencies as recorded in the detailed description of the tables and graphs which follows. The report is edited by Miss J. V. Lincoln of the Sun-Earth Relationships Section.

I DAILY SOLAR INDICES

Relative Sunspot Numbers -- The table includes (1) the daily American relative sunspot numbers, R_A', as compiled by the Solar Division of the American Association of Variable Star Observers, and (2) the provisional daily Zürich relative sunspot numbers, R_Z, as communicated by the Swiss Federal Observatory. Because of the time required to collect and reduce the observations, R_A' will normally appear one month later than R_Z.

The relative sunspot number is an index of the activity of the entire visible disk. It is determined each day without reference to preceding days. Each isolated cluster of sunspots is termed a sunspot group and it may consist of one or a large number of distinct spots whose size can range from 10 or more square degrees of the solar surface down to the limit of resolution (e.g. 1/8 square degrees). The relative sunspot number is defined as $R=K(10g+s)$, where g is the number of sunspot groups and s is the total number of distinct spots. The scale factor K (usually less than unity) depends on the observer and is intended to effect the conversion to the scale originated by Wolf. The observations for sunspot numbers are made by a rather small group of extraordinarily faithful observers, many of them amateurs, each with many years of experience. The counts are made visually with small, suitably protected telescopes.

Final values of R_Z appear in the IAU Quarterly Bulletin on Solar Activity, the Journal of Geophysical Research and elsewhere. They usually differ slightly from the provisional values. The American numbers, R_A', are not revised.

Solar Flux Values, 2800 Mc -- The table also lists the daily values of solar flux at 2800 Mc recorded in watts/M^2/cycle/second bandwidth (x 10^{-22}) in two polarizations by the National Research Council at Ottawa, Canada. These solar radio noise indices are being published in accordance with CCIR Report 25 that a basic solar index for ionospheric propagation should be measured objectively and "preferably refer to a property of the sun such as radiation flux which has direct physical relationship to the ionosphere."

Graph of Sunspot Cycle -- The graph illustrates the recent trend of Cycle 19 of the 11-year sunspot cycle and some predictions of the future level of activity. The customary "12-month" smoothed index, R, is used throughout, the data being final R_Z numbers except for the current year. Predictions shown are those made for one year after the latest available datum by the method of A. G. McNish and J. V. Lincoln (Trans. Am. Geophys. Union, 30, 673-685, 1949) modified by the use of regression coefficients and mean cycle values recomputed for Cycles 8 through 18. Cycle 19 began April 1954, when the minimum $\overline{R}$ of 3.4 was reached.

II SOLAR CENTERS OF ACTIVITY

Calcium Plage and Sunspot Regions -- The table gives particulars of the centers of activity visible on the solar disk during the preceding month. These are based on estimates made and reported on the day of observation and are therefore of limited reliability.

The table gives the heliographic coordinates of each center (taken as the calcium plage unless two or more significantly and individually active sunspot groups are included in an extended plage) in terms of the Greenwich date of passage of the sun's central meridian (CMP) and the latitude; the serial number of the plage as assigned by McMath-Hulbert Observatory; the serial number of the center in the previous solar rotation, if it is a persisting region; particulars of the plage at CMP: area, central intensity; a summary of the development of the plage during the current transit of the disk, where b = born on disk, ℓ = passed to or from invisible hemisphere, d = died on disk, and / = increasing, - = stable, \ = decreasing; and age in solar rotations; particulars of the associated sunspot group, if any, at CMP: area and spot count and the summary of development during the current disk transit, similar to the above. The unit of area is a millionth of the area of a solar hemisphere; the central intensity of calcium plages is roughly estimated on a scale of 1 = faint to 5 = very bright.

Calcium plage data are available through the cooperation of the McMath-Hulbert Observatory of the University of Michigan and the Mt. Wilson Observatory. The sunspot data are compiled from reports from the U. S. Naval Observatory, Mt. Wilson Observatory, and from reports from Europe and Japan received through the daily Ursigram messages.

Coronal Line Emission Indices -- In the table are summarized solar coronal emission intensity indices for the green (Fe XIV at λ5303) and red (Fe X at λ6374) coronal lines. The indices are based on measurements made at 5° intervals around the periphery of the solar disk by the High Altitude Observatory at Climax, Colorado, and by Harvard University observers at Sacramento Peak (The USAF Upper Air Research Observatory at Sunspot, New Mexico, under contract AF 19(604)-146). The measurements are expressed as the number of millionths of

an Angstrom of the continuum of the center of the solar disk (at the same wavelength as the line) that would contain the same energy as the observed coronal line. The indices have the following meanings:

G_6 = mean of six highest line intensities in quadrant for λ5303.

R_6 = same for λ6374.

G_1 = highest value of intensity in quadrant, for λ5303.

R_1 = same for λ6374.

The dates given in the table correspond to the approximate time of CMP of the longitude zone represented by the indices. The actual observations were made for the North East and South East quadrants 7 days before; for the South West and North West quadrants 7 days after the CMP date given.

To obtain rough measures of the integrated emission of the entire solar disk in either of the lines, assuming the coronal changes to be small in a half solar rotation, it is satisfactory to perform the following type of summation given in example for 15 October:

$$\left(\begin{matrix}\text{MEAN DISK EMISSION}\\ \text{IN } \lambda 5303\end{matrix}\right)_{15\text{ OCT}} = \frac{1}{N}\left[\sum_{15\text{ OCT}}^{22\text{ OCT}}\left\{(G_6)_{NE}+(G_6)_{SE}\right\} + \sum_{8\text{ OCT}}^{14\text{ OCT}}\left\{(G_6)_{SW}+(G_6)_{NW}\right\}\right]$$

where N is the number of indices entering the summation.

Such integrated disk indices as well as integrated whole-sun indices are computed for each day and are published quarterly in the "Solar Activity Summary" issued by the High Altitude Observatory at Boulder, Colorado. In the same reports are given maps of the intensity distribution of coronal emission derived from all available Climax and Sacramento Peak observations, as well as other information on solar activity, such as maps made from daily limb prominence surveys in Hα and notes regarding the history of active regions on the solar disk.

Preliminary summaries of solar activity, prepared on a fast schedule, are issued Friday of each week from High Altitude Observatory in conjunction with CRPL and include solar activity through the preceding day. These are useful to groups needing information on the current status of activity on the visible solar disk, but are not recommended for research uses unless such a prompt schedule of reporting is essential. The same information is included in the subsequent quarterly reports, with extensive additions, corrections and evaluations.

III SOLAR FLARES

Optical Observations -- The table presents the preliminary record of solar flares as reported to the CRPL on a rapid schedule at the sacrifice of detailed accuracy. Definitive and complete data are published later in the Quarterly Bulletin on Solar Activity, I.A.U., in various observatory publications and elsewhere. The present listing serves to identify and roughly describe the phenomena observed.

Reporting directly to the CRPL are the following observatories: McMath-Hulbert, Wendelstein, Sacramento Peak, Mitaka and Swedish Astrophysical Station on Capri. The remainder report through the URSIgram centers or are available through the IGY World Data Center for Solar Activity in Boulder. Observations are in the light of the center of the H-alpha line unless noted otherwise. The reports from Sacramento Peak, New Mexico (communicated to CRPL by the High Altitude Observatory at Boulder) are from observations at the USAF Upper Air Research Observatory at Sunspot, New Mexico, by Harvard University observers, under contract AF 19(604)-146.

For each flare are listed the reporting observatory, the date, beginning and ending times, time of maximum phase, the heliographic coordinates in degrees, McMath serial number of the region, duration, the flare importance on the IAU scale of 1- to 3+, observing conditions where 1 means poor, 2 fair and 3 good, time of measurement for tabulated width of Hα or tabulated area, measured (i.e. projected) maximum area in square degrees, corrected maximum area in square degrees which equals measured area times secant h where h is the heliocentric angle, maximum effective line-width in Hα expressed in Angstroms, and maximum intensity of Hα expressed in per cent of the continuous spectrum. The following symbols are used in the table:

D = Greater than	F = Approximately
E = Less than	G = Plus

A final column lists provisionally the occurrence of simultaneous ionospheric effects as observed on selected field-strength recordings of distant high-frequency radio transmissions; a more nearly definitive list of these ionospheric effects, including particulars, appears in these reports after the lapse of a month (see below). All times are Universal Time (UT or GCT). Subflares (importance 1-) are listed by date, time of beginning and their heliographic coordinates. A graph presents intervals for which there were no patrols for flare observations from the observatories whose complete data are published in the table.

Ionospheric Effects -- SID (and GID--gradual ionospheric disturbances) may be detected in a number of ways: short wave fadeouts, enhancement of low frequency atmospherics, increases in cosmic absorption, and so forth. The table lists events that have been recognized on field-strength recordings of distant high-frequency radio transmissions.

Under a coordinated program, the staffs at the following ionospheric sounding stations contribute reports that are screened and synthesized at CRPL-Boulder: Puerto Rico, Ft. Belvoir, Va., and Anchorage, Alaska (CRPL Stations: PR, BE, AN); Huancayo, Peru, and College, Alaska (CRPL-Associated Laboratories: HU, CO); and White Sands, N. Mex., Adak, Alaska, and Okinawa (U.S. Signal Corps Stations: WS, AD, OK). McMath-Hulbert Observatory (MC) also contributes such reports. In addition, reports are volunteered by RCA Communications Inc., Marconi Wireless, Netherlands Postal and Telecommunications Services, Swedish Telecommunications, and others; these usually specify times of SID and the radio paths involved.

In the coordinated program, the abnormal fades of field strength not obviously ascribable to other causes, are described as short wave fadeouts with the following further classification:

S-SWF:	sudden drop-out and gradual recovery
Slow S-SWF:	drop-out taking 5 to 15 minutes and gradual recovery
G-SWF:	gradual disturbance; fade irregular in both drop-out and recovery.

When there is agreement among the various reporting stations on the time (UT) of an event, it is accepted as a widespread phenomenon and listed in the table.

The degree of confidence in identifying the event, a subjective estimate, is reported by the stations and this is summarized in an index of certainty that the event is widespread, ranging from 1 (possible) to 5 (definite). The times given in the table for the event are from the report of a station (underlined in table) that identified it with high confidence. The criteria for the subjective importance rating assigned by each station on a scale of 1- to 3+ include amplitude of the fade, duration and confidence; greater consideration is given to reports on paths near the subsolar point in arriving at the summary importance rating given in the table.
Note: The tables of SID observed at Washington included in CRPL F-reports prior to F-135 were restricted to events classed here as S-SWF.

IV SOLAR RADIO WAVES

2800 Mc Observations

The data on solar radio wave events made in Ottawa, Canada by the Radio and Electrical Engineering Division of the National Research Council (A. E. Covington) at 2800 Mc (10-cm emission) are presented. Near local noon (about 1700 UT) the sensitivity of the radiometer is determined and a mean flux for the whole day calculated. These values are given in a tabular form (see table I-1) in units of 10^{-22} watts/M^2/c/s. Burst phenomena are measured above this level and are given in terms especially suitable for the variations

observed on this frequency. The basis for the classifications is described by Covington - J.R. Astro. Soc. Can. 45, 49, 1951 and Dodson, Hedeman and Covington, Ap. J. 119, 541, 1954. A modification in terminology with a view to simplification has been introduced and consists essentially of the omission of the descriptive word "Single" from the "Single-Simple" and "Single-Complex" classes; in designating the "Single", "Single-Simple" and "Rise and Fall" bursts into a single classification designated as "Simple Bursts" with an appropriate type number; in the addition of the letter "f" to indicate that the burst deviates from the basic pattern by the presence of one or more small fluctuations in intensity; and by the addition of the letter "A" to indicate that the event has another smaller duration event superimposed upon it.

Simple Burst

Any single burst which rises to one maximum and then decreases to the pre-burst level.

1 - Simple 1 -- Simple burst, type 1 (formerly "single"). Bursts of intensity less than 7 1/2 flux units and duration less than 7 1/2 minutes.

2 - Simple 2 -- Simple burst, type 2 (formerly "single-simple"). Bursts of impulsive nature with intensity greater than 7 1/2 flux units.

3 - Simple 3 -- Simple burst, type 3 (formerly "rise and fall"). Bursts of moderate intensity with duration greater than 7 1/2 minutes.

4 - Post-burst increase -- Postburst level is greater than the preburst level. The gradual return to normal flux may require as long as several hours.

5 - Absorption following burst (negative post).

6 - Complex -- (formerly "single-complex"). A single burst which shows two or more comparable maxima before the activity has declined to zero.

7 - Period of irregular activity or fluctuations -- Series of overlapping bursts of moderate intensity and duration.

8 - Group -- Series of single isolated bursts occurring in succession with intensity between the events equal to the level before and after the group.

9 - Precursor -- A small increase of intensity occurring before a larger increase.

<u>Great Burst</u>

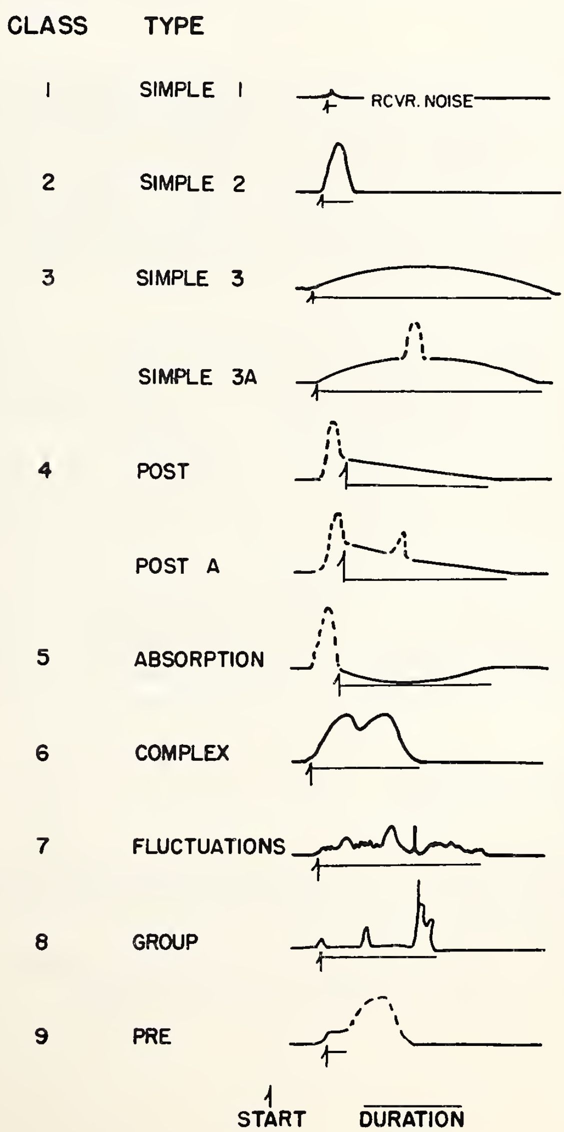
Infrequently occurring bursts of great intensity, often of complicated structure.

<u>Letter "A"</u>

Indicates that this event has another event superimposed upon it.

<u>Letter "f"</u>

Indicates that the basic form of the event is modified by secondary fluctuations.



200 Mc Observations

Data on solar radio waves made at Cornell University, Ithaca, N.Y. (Marshall Cohen) on 201.5 Mc are presented. All times are in Universal Time (UT or GCT). The antenna is linearly polarized and has a pattern appreciably broader than the solar disk. Flux is reported in units of 10^{-22} watts/m^2/cps and the tabulated numbers are twice the values observed in the one linear component.

Tables of flux and outstanding occurrences are given in general according to the systems used for the NBS 170 Mc and 450 Mc data.

170 Mc and 450 Mc Observations

Data on solar radio emission at the nominal frequencies of 170 Mc and 450 Mc recorded at the Gunbarrel Hill (Boulder) station of the National Bureau of Standards (R.S. Lawrence) are presented. The half width of the antenna lobe is appreciably greater than the solar disk. Polarization is not determined, but the dipole is oriented E-W. All times are in Universal Time (UT or GCT).

3-Hourly and Daily Flux Density and Variability -- Flux density is given in power units. These units are approximately 10^{-22} watts meter^{-2}(c/s)$^{-1}$ for both polarizations together. They will be subject to a correction factor when gain measurements of the antenna have been made. The median flux is measured for every one-hour period having at least thirty minutes of usable record and an applicable gain calibration. A three-hour value of flux is obtained by averaging the available one-hour medians (at least two required). A daily value of flux is obtained by averaging all available one-hour medians (at least four required). A dash indicates that insufficient measurements were made to meet the above requirements or that the records were not of usable quality. Flux values may be followed by the qualifying symbols D, S, and X defined subsequently.

The variability index, given for each three-hour interval, is on a scale 0 to 3 defined as follows:

0 - The instantaneous flux did not drop below one-half the median level or exceed twice the median level at any time.

1 - The instantaneous flux made from one to ten excursions

outside the range described above.

2 - The instantaneous flux made from ten to one hundred excursions outside the range described above.

3 - The instantaneous flux made more than one hundred excursions outside the range described above.

For the purpose of the variability index, an excursion whose maximum intensity is M times the median level is counted as M excursions. The variability index is omitted if measurements were made for less than one hour during the period. The variability for the day is the mean of the three-hourly values. The letter S follows variability indices which are in doubt because of atmospherics or local interference.

The observing periods are given in U. T. to the nearest 1/10 hour and they usually extend into the next Greenwich day.

Outstanding Occurrences -- A separate table lists the occurrences which are not adequately described by the three-hourly values of flux density and variability. Two classifications are given: (1) A system in general accord with that described and illustrated by Dodson, Hedeman, and Owren (Ap. J. 118, 169, 1953) and (2) the system described in the IGY Solar Activity Instruction Manual, prepared by the Radio Emission editor of the I.A.U. Quarterly Bulletin on Solar Activity.

In system (1) the occurrences are identified by numbers which do not necessarily indicate the magnitude of the event, as follows:

0 - Rise in base level -- A temporary increase in the continuum with duration of the order of tens of minutes to an hour.

1 - Series of bursts -- Bursts or groups of bursts, occurring intermittently over an interval of time of the order of minutes or hours. Such series of bursts are assigned as distinctive events only when they occur on a smooth record or show as a distinct change in the activity.

2 - Groups of bursts -- A cluster of bursts occurring in an interval of time of the order of minutes.

3 - Minor burst -- A burst of moderate or small amplitude, and duration of the order of one or two minutes.

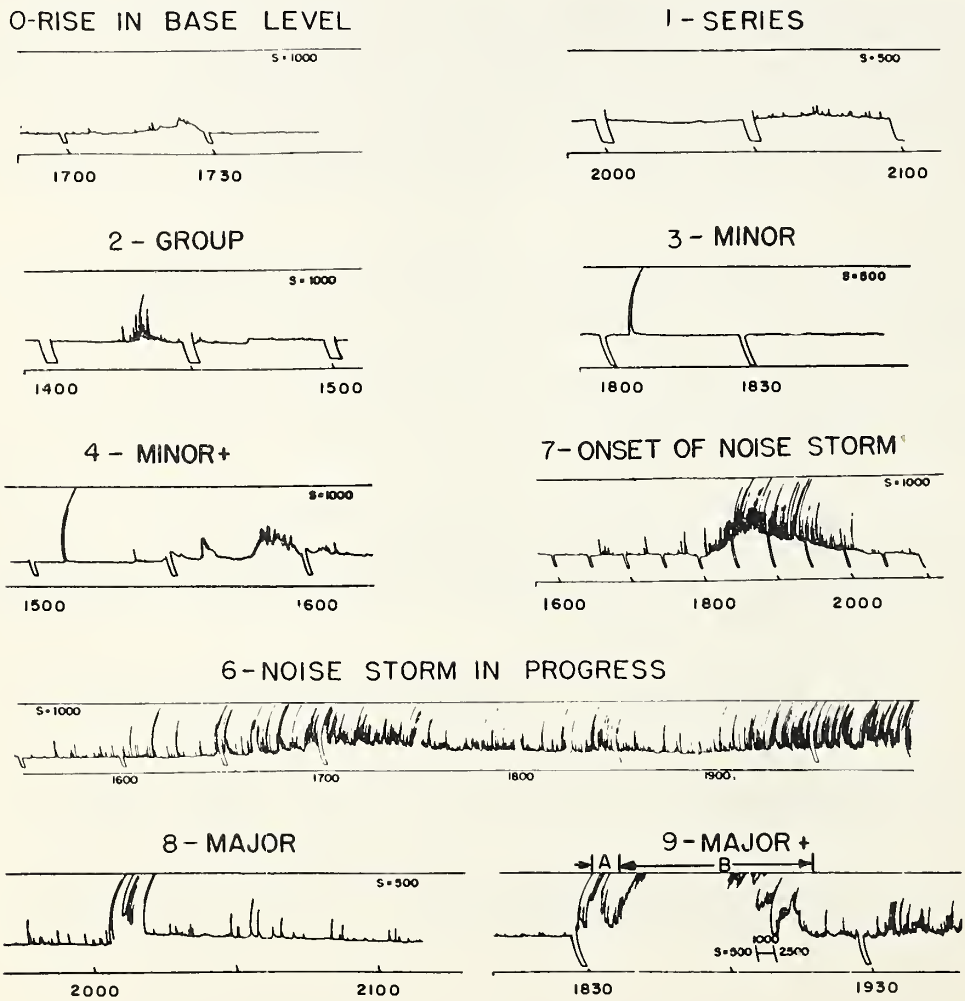
4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

6 - Noise storm -- A temporary increase in radiation characterized by numerous closely spaced bursts, by an increase in the continuum, or by both. Duration is of the order of hours or days.

7 - Noise storm begins -- The onset of a noise storm occurs at some time during the observing period.

8 - Major burst -- An outburst, or other burst of large amplitude and more than average duration. A major burst is usually complex, with a duration of the order of one to ten minutes.

9A, 9B, or 9 - Major burst and second part or large event without distinct first and second parts -- If there is a double rise in flux, the first part, a major burst, is listed as 9A and the second part as 9B. The second part may consist of a rise in base level, a group or series of bursts, a noise storm. A major increase in flux with duration greater than ten minutes but without distinct first and second parts, is listed simply as 9.



In system (2) combinations of the following letters are used to describe some distinctive characteristics of the recorded disturbances:

S = simple rise and fall of intensity,
C = complex variation of intensity,
A = appears to be part of general activity,
D = distinct from (i.e. apparently superimposed upon) the general background,
M = multiple peaks separated by relatively long periods of quietness,
F = multiple peaks separated by relatively short periods of quietness,
E = sudden commencement or rise of activity.

Starting and maximum times are read to the nearest 1/10 minute if they are very definite and otnerwise to the nearest minute. If the duration is less than five minutes, it is given to the nearest 1/10 minute; otherwise to the nearest minute (see also qualifying symbols below).

Maximum flux densities are given in units of 10^{-22} watts meter^{-2}(c/s)$^{-1}$. The instantaneous maximum flux density is the highest peak in the disturbance measured above the sky level. The smoothed maximum flux density is the maximum value of a smooth curve drawn through the outstanding occurrence with a smoothing period of 20 to 50 percent of the total duration; it is measured above the estimated level in the absence of the disturbance. The intention is that (smoothed maximum) x (duration) should give a measure of the energy radiated in the disturbance.

A dash indicates missing or insignificant data. Observations are interrupted during the period from 26 to 29 minutes after each hour for calibrations. Observing periods are given in the Daily Data tables. The following qualifying symbols are used:

B - Event in progress before observations began.
D - Greater than.
I - Event apparently continued during an interruption of the observations. The period of the interruption may be given in the remarks.
N - See footnotes.
X - Measurement is uncertain or doubtful.
S - Measurement may be influenced by interference or atmospherics.

V GEOMAGNETIC ACTIVITY INDICES

C, Kp, Ap, and Selected Quiet and Disturbed Days -- The data in the table are: (1) preliminary international character figures, C; (2) geomagnetic planetary three-hour range indices, Kp; (3) daily "equivalent amplitude," Ap; (4) magnetically selected quiet and disturbed days.

This table is made available by the Committee on Characterization of Magnetic Disturbance of IAGA, IUGG. The Meteorological Office, De Bilt, Holland collects the data from magnetic observatories distributed throughout the world, and compiles C and selected days. The Chairman of the Committee computes the planetary and equivalent amplitude indices. The same data are also published quarterly in the Journal of Geophysical Research along with data on sudden commencements (sc) and solar flare effects (sfe).

The C-figure is the arithmetic mean of the subjective classification by all observatories of each day's magnetic activity on a scale of 0 (quiet) to 2 (storm).

Kp is the mean standardized K-index from 12 observatories between geomagnetic latitudes 47 and 63 degrees. The scale is 0 (very quiet) to 9 (extremely disturbed), expressed in thirds of a unit, e.g. 5- is 4 2/3, 5o is 5 0/3, and 5+ is 5 1/3. This planetary index is designed to measure solar particle-radiation by its magnetic effects, specifically to meet the needs of research workers in the ionospheric field. A complete description of Kp has appeared in Bulletin 12b, "Geomagnetic Indices C and K, 1948" of the Association of Terrestrial Magnetism and Electricity (IATME), International Union of Geodesy and Geophysics.

Ap is a daily index of magnetic activity on a linear scale rather than on the quasi-logarithmic scale of the K-indices. It is the average of the eight values of an intermediate 3-hourly index "ap," defined as one-half the average gamma range of the most disturbed of the three force components, in the three-hour interval at standard stations; in practice, ap is computed from the Kp for the 3-hour interval. The extreme range of the scale of Ap is 0 to 400. The method is described in IATME Bulletin No. 12h (for 1953) p. viii f. Values of Ap (like Kp and Cp) have been published for the Polar Year 1932/33 and for the years 1937 onwards.

The magnetically quiet and disturbed days are selected in accordance with the general outline in Terr. Mag. (predecessor to J. Geophys. Res.) 48, pp 219-227, December 1943. The method in current use calls for ranking the days of a month by their geomagnetic activity as determined from the following three criteria with equal weight: (1) the sum of the eight Kp's; (2) the sum of the squares of the eight Kp's; and (3) the greatest Kp.

<u>Chart of Kp by Solar Rotations</u> -- The graph of Kp by solar rotations is furnished through the courtesy of Dr. J. Bartels, Geophysikalisches Institute, Göttingen.

VI RADIO PROPAGATION QUALITY INDICES

One can take as the definition of a radio propagation quality index: the measure of the efficiency of a medium-powered radio circuit operated under ideal conditions in all respects, except for the variable effect of the ionosphere on the propagation of the transmitted signal. The indices given here are derived from monitoring and circuit performance reports, and are the nearest practical approximation to the ideal index of propagation quality.

Quality indices are usually expressed on a scale that ranges from one to nine. Indices of four or less are generally taken to represent significant disturbance. (Note that for geomagnetic K-indices, disturbance is represented by higher numbers.) The adjectival equivalents of the integral quality indices are as follows:

1 = useless	4 = poor-to-fair	7 = good
2 = very poor	5 = fair	8 = very good
3 = poor	6 = fair-to-good	9 = excellent

CRPL forecasts are expressed on the same scale. The tables summarizing the outcome of forecasts include categories P-Perfect; S-Satisfactory; U-Unsatisfactory; F-Failure. The following conventions apply:

P - forecast quality equal to observed

S - forecast quality one grade different from observed

U - forecast quality two or more grades different from observed when <u>both</u> forecast and observed were > 5, or both < 5

F - other times when forecast quality two or more grades different from observed

Full discussion of the reliability of forecasts requires consideration of many factors besides the over-simplified summary given.

The quality figures represent a consensus of experience with radio propagation conditions. Since they are based entirely on monitoring or traffic reports, the reasons for low quality are not necessarily known and may not be limited to ionospheric storminess. For instance, low quality may result from improper frequency usage for the path and time of day. Although, wherever it is reported, frequency usage is included in the rating of reports, it must often

be an assumption that the reports refer to optimum working frequencies. It is more difficult to eliminate from the indices conditions of low quality for reasons such as multipath or interference. These considerations should be taken into account in interpreting research correlations between the Q-figures and solar, auroral, geomagnetic or similar indices.

North Atlantic Radio Path -- The CRPL quality figures, Qa, are compiled by the North Atlantic Radio Warning Service (NARWS), the CRPL forecasting center at Ft. Belvoir, Virginia, from radio traffic data for North Atlantic transmission paths closely approximating New York-to-London. These are reported to CRPL by the Canadian Defense Research Board, Canadian Broadcasting Corporation, and the following agencies of the U. S. Government:--Coast Guard, Navy, Army Signal Corps, U. S. Information Agency. Supplementing these data are CRPL monitoring, direction-finding observations and field-strength measurements of North Atlantic transmissions made at Belvoir.

The original reports are submitted on various scales and for various time intervals. The observations for each 6-hour interval are averaged on the original scale. These 6-hour indices are then adjusted to the 1 to 9 quality-figure scale by a conversion table prepared by comparing the distribution of these indices for at least four months, usually a year, with a master distribution determined from analysis of the reports originally made on the 1 to 9 quality-figure scale. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. The 6-hourly quality figure is the mean of the reports available for that period.

The 6-hourly quality figures are given in this table to the nearest one-third of a unit,e.g. 5o is 5 and 0/3; 5- is 4 and 2/3; 5+ is 5 and 1/3. Other data included are:

(a) Whole-day radio quality indices, which are weighted averages of the four 6-hourly indices, with half weight given to quality grades 5 and 6. This procedure tends to give whole-day indices suitable for comparison with whole-day advance forecasts which seek to designate the days of significant disturbance or unusually quiet conditions.

(b) Short-term forecasts, issued every six hours by the North Atlantic Radio Warning Service. These are issued one hour before 00^h, 06^h, 12^h, 18^h, UT and are applicable to the period 1 to 7 hours ahead.

(c) Advance forecasts, issued twice weekly by the NARWS (CRPL-J reports) and applicable 1 to 3 or 4 days ahead, 4 or 5 to 7 days ahead, and 8 to 25 days ahead. These forecasts are scored against the whole-day quality indices.

(d) Half-day averages of the geomagnetic K indices measured by the Fredericksburg Magnetic Observatory of the U. S. Coast and Geodetic Survey.

A chart compares the short-term forecasts with Qa-figures. A second chart compares the outcome of advance forecasts (1 to 3 or 4 days ahead) with a type of "blind" forecast. For the latter, the frequency for each quality grade, as determined from the distribution of quality grades in the four most recent months of the current season, is partitioned among the grades observed in the current month in proportion to the frequencies observed in the current month.

Ranges of useful frequencies on the North Atlantic radio path are shown in a series of diagrams, one for each day. The shaded area indicates the range of frequencies for which transmissions of quality 5 or greater were observed. The blacker the diagram, the quieter the day has been; a narrow strip indicates either high LUHF, low MUF, or both. These diagrams are based on data reported to CRPL by the German Post Office through the Fernmeldetechnischen Zentralamtes, Darmstadt, Germany, being observations every one and a half hours of selected transmitters located in the eastern portion of North America. The magnetic activity index, A_{Fr}, from Fredericksburg, Va., is also given for each day.

Note: Beginning with data for September 1955, Qa has been determined from reports that are available within a few hours or at most within a few days, including for the first time, the CRPL observations. Therefore these are the indices by which the forecasters assess every day the conditions in the recent past. Over a period of several years, they have closely paralleled the former Qa indices which excluded CRPL observations and included three additional reports received after a considerable lag. Qa was first published to the nearest one-third of a unit at the same time.

North Pacific Radio Path -- The CRPL quality figures, Qp, are compiled by the North Pacific Radio Warning Service (NPRWS), the CRPL forecasting center at Anchorage, Alaska, from radio traffic data for moderately long transmission paths in the North Pacific equivalent to Seattle-to-Anchorage or Anchorage-to-Tokyo. These include reports to CRPL by the Alaska Communications System, Aeronautical Radio, Inc., U. S. Air Force and Civil Aeronautical Administration. In addition, there are CRPL monitoring, direction finder observations and field strength measurements of suitable transmissions.

The original reports are on various scales and for various time intervals. The observations for each 8 hours or 24 hour period are averaged on the original scale. This average is compared with reports for the same period in the preceding two months and expressed

as a deviation from the 3-month mean. The deviations are put on the 1 to 9 scale of quality which is assumed to have a standard deviation of 1.25 and a mean for the various periods as follows:

03-10 hours UT	5.33
11-18	5.33
19-02	6.00
00-24	5.67

The 8-hour and 24-hour indices Qp are determined separately. Each index is a weighted mean where the CRPL observations have unit weight and the others are weighted by the correlation coefficient with the CRPL observations.

The table, analagous to that for Qa, includes the 8-hourly quality figures; whole day quality figures; short-term forecasts issued by NPRWS three times daily at 02^h, 10^h, and 18^h UT, applicable to the stated 8-hour periods; advance forecasts issued twice weekly by NPRWS (CRPL-Jp report); and half-day averages of geomagnetic K indices from Sitka.

The chart compares the outcome of advance forecasts, on the same basis as the similar chart for the North Atlantic Radio Path.

Note: Beginning with November 1956 the short-term forecast formerly made at 0900 UT was changed to 1000 UT. The North Pacific quality figures used for evaluation are now 8-hourly rather than 9-hourly.

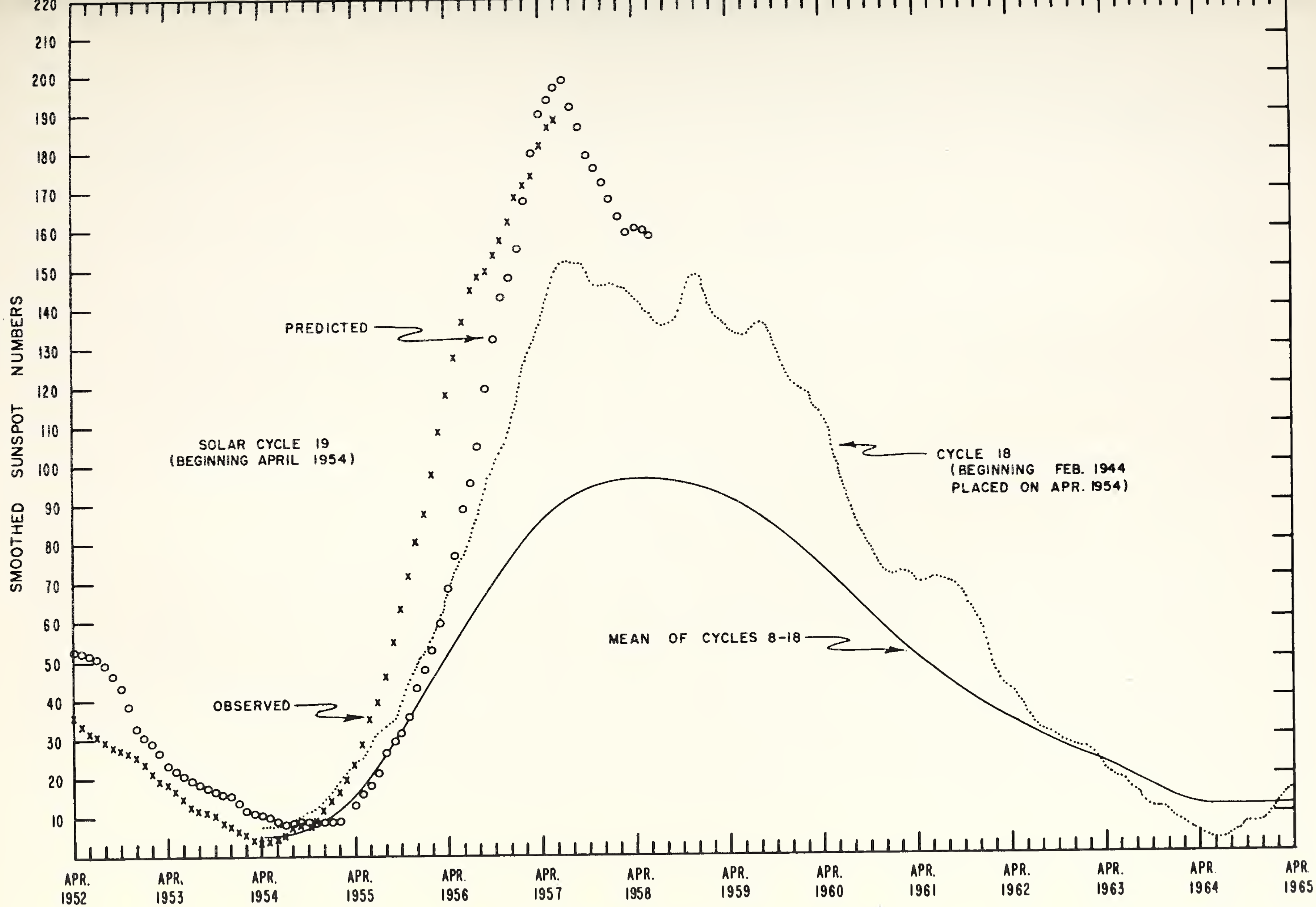
VII ALERT PERIODS AND SPECIAL WORLD INTERVALS

A table gives the Alert Periods and Special World Intervals (SWI) as designated by the IGY World Warning Agency at Ft. Belvoir, Va. For each day of the Alert or SWI are given the number of flares of importance two or greater reported promptly to the IGY World Warning Agency and the magnetic activity index A_{Be} observed at the IGY World Warning Agency.

DAILY SOLAR INDICES

Nov. 1957	American Relative Sunspot Numbers R_A'
1	241
2	234
3	198
4	243
5	200
6	202
7	167
8	170
9	214
10	229
11	208
12	199
13	199
14	191
15	176
16	164
17	150
18	148
19	157
20	165
21	188
22	235
23	226
24	190
25	163
26	132
27	173
28	196
29	180
30	201
Mean:	191.3

Dec. 1957	Zürich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 Mc, Ottawa, Canada Flux
1	216	295
2	206	270
3	218	283
4	225	278
5	258	273
6	220	271
7	164	234
8	187	242
9	137	229
10	143	210
11	150	211
12	153	209
13	155	222
14	164	228
15	170	236
16	189	252
17	205	278
18	227	291
19	249	293
20	284	333
21	298	348
22	302	365
23	330	377
24	345	370
25	357	---
26	366	356
27	269	342
28	260	317
29	275	282
30	274	276
31	255	280
Mean:	233.9	281.7



PREDICTED AND OBSERVED SUNSPOT NUMBERS

CALCIUM PLAGE AND SUNSPOT REGIONS

DECEMBER 1957

CMP Dec. 1957	Lat	McMath Plage Number	Return of Region	Calcium Plage Data: CMP Values Area	Int.	History, Age	Sunspot Data: CMP Values Area	Count	History
01.1	S13	4293	New	(1200)	(3.5)	b / ℓ 1	(340)	(4)	b ⌐ ℓ
02.5	S21	4272	4218	2000	3	ℓ — ℓ 4	40	1	ℓ \ ℓ
03.1	S06	4278	New	2800	2	ℓ — ℓ 1	60	3	ℓ \ d
03.2	N20	4274	*	1000	2	ℓ — ℓ *			
03.7	N45	4281	4212	900	1.5	ℓ — ℓ 3			
03.7	S21	4288	4218	8000	3.5	ℓ — ℓ 4	1560	21	ℓ — ℓ
04.4	N16	4292	New	400	2	b ⌐ ℓ 1	290	4	b ∧ ℓ
05.3	N39	4282	4220	400	1.5	ℓ — d 3			
05.9	N30	4283	4220	500	1	ℓ — d 3			
06.2	N17	4284	4228	800	1	ℓ — d 8			
06.2	S26	4285	New	2700	2.5	ℓ — ℓ 1	220	15	ℓ ¬ d
06.2	S06	4286	4241	400	1	ℓ — d 2			
06.6	N07	4287	New	1200	2	ℓ — d 1	40	6	ℓ — d
07.8	N07	4290	New	(400)	(1.5)	ℓ ⌐ ℓ 1	50	7	ℓ — ℓ
08.1	S23	4291	4226	(500)	(1)	ℓ — d? 3			
08.2	N22	4289	4230	(400)	(1)	ℓ — d 2			
08.8	N26	4294	4230	4000	1	ℓ / ℓ 2	(70)	(7)	ℓ \ d
09.6	N16	4295	4230	(3500)	(3)	ℓ — ℓ 2			
09.6	S18	4297	4236	4000	1	ℓ ¬ ℓ 4	210	4	ℓ — ℓ
10.4	N30	4298	4235	(700)	(1.5)	ℓ — ℓ 8			
10.7	S18	4300	4236	1600	3.5	ℓ — ℓ 4	40	1	b — d
10.7	S35	4301	New	2500	2.5	? — ℓ 1			
11.1	N08	4296	4233	7000	3.5	ℓ / ℓ 2	690	12	ℓ — ℓ
12.6	S27	4302	4237	2200	3	ℓ — ℓ 4	140	2	b — d
13.1	S15	4303	4238	1400	3	ℓ — ℓ 5	50	1	b \ d
13.2	N27	4304	4234	2800	1.5	ℓ — ℓ 8			
14.0	N15	4305	4242	1900	2.5	ℓ — ℓ 1	100	2	b \ d
15.0	N10	4306	4242	500	2.5	ℓ — ℓ 1			
15.1	S08	4307	4243	1200	2.5	ℓ — ℓ 2			
15.9	N22	4309	4247	2000	2	ℓ — ℓ 7			
16.1	S14	4308	4243	800	2.5	ℓ — ℓ 2	120	10	b └ ℓ
16.7	S26	4310	4245	1200	2.5	ℓ — ℓ 3	20	1	ℓ — d
17.8	S25	4311	New	800	2.5	ℓ / ℓ 1	140	2	b ∧ d
17.9	N16	4312	4247	2900	2.5	ℓ — ℓ 7	50	4	b ¬ d
19.0	S12	4313	New	7000	3	ℓ ¬ ℓ 1	970	12	ℓ — ℓ
20.0	N18	4314	New	10,000	3.5	ℓ — ℓ 1	1360	37	ℓ ∧ ℓ
20.8	S17	4315	4255	1200	1.5	ℓ — ℓ 3			
21.7	N24	4316	New	4700	3	ℓ — ℓ 1	240	3	ℓ \ d
22.7	S16	4318	4257	2500	2	ℓ — ℓ 3	80	6	b — d
23.2	N21	4317	New	3500	3	ℓ — ℓ 1	680	38	ℓ ⌐ ℓ
24.2	N21	4321	New	4000	3	ℓ — ++ 1	1160	13	ℓ — ℓ
24.5	S22	4319	4263	5000	2.5	ℓ — ℓ 5	780	6	ℓ ∨ ℓ
24.8	N13	4320	New+	(200)	(1)	ℓ — d 1			
25.5	S21	4322	***	1800	2.5	ℓ — ℓ 5	140	1	
26.0	N28	4328	New++	6000	3	++ — ℓ 1	1890	18	ℓ — ℓ
26.8	S30	4329	New+	500	1.5	ℓ \ d 1			
26.9	S14	4323	4269	6500	2.5	ℓ — ℓ 2	720	14	b ∧ ℓ
26.9	N22	4324	4271	1300	2	ℓ — ℓ 6	140	5	b — d
27.4	N14	4325	4271	1500	1.5	ℓ — ℓ 6	540	12	ℓ ¬ ℓ
28.2	S20	4327	New	1000	2.5	ℓ ¬└ ℓ 1	70	5	b └ d
28.4	S04	4326	New	1300	3	ℓ └ ℓ 1	110	3	ℓ └ ℓ
28.4	N18	4330	4271	2100	2	ℓ ¬ d 6			
28.6	N05	4334	New	800	2.5	b / ℓ 1	230	9	b \ d
29.8	N10	4331	New	(1500)	(2.5)	ℓ — ℓ 1	(20)	(1)	b — d
29.8	S18	4333	4272	(3800)	(2.5)	ℓ — ℓ 5	320	13	b ⌐ ℓ
30.3	S03	4332	4278	(900)	(2.5)	ℓ \ d 2			
31.3	S22	4335	4288	1500	2	ℓ — ℓ 5	50	1	ℓ ¬ d
31.3	S12	4336		6000	2.5	ℓ — ℓ	100	5	b \ d
31.8	N22	4337		4200	2.5	ℓ — ℓ	440	8	ℓ └ ℓ

* 4229, 4231. Age 2,3.
** 4267,4265.
\+ Ephemeral.
++ Region 4321 is broken into 4321 and 4328; later combined again and numbered 4328.

Note: Long gaps in McMath observations render identifications and disk passage histories questionable in some cases.

CORONAL LINE EMISSION INDICES

DECEMBER 1957

CMP Dec. 1957	North East Quadrant (observed 7 days earlier)				South East Quadrant (observed 7 days earlier)				South West Quadrant (observed 7 days later)				North West Quadrant (observed 7 days later)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	117	143	x	x	139*	222	x	x	127*	184	41	80	68	90	21	33
3	168	200	60	92	178*	376	42	69	349*	450	58	89	119	210	48	60
4	x	x	x	x	x	x	x	x	107*	114	51	91	89	110	23	40
5	x	x	x	x	x	x	x	x	151	204	x	x	99	119	x	x
6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7	117	162	24	36	98	118	28	57	x	x	x	x	x	x	x	x
8	141	208	34	46	x	x	49	93	x	x	x	x	x	x	x	x
9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	168	260	44	78	210	280	26	36	x	x	x	x	x	x	x	x
11	167	220	40	78	206	256	x	x	x	x	x	x	x	x	x	x
12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
13	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14	x	x	x	x	x	x	x	x	99	136	x	x	144	156	x	x
15	x	x	x	x	x	x	x	x	140	244	x	x	136	180	x	x
16	197	355	57	120	179	265	37	84	93	156	103a	188a	103	168	47a	79a
17	183	290	43	84	103	124	42	69	x	x	x	x	x	x	x	x
18	109	146	26	66	94*	164	54	107	x	x	x	x	x	x	x	x
19	198*	400	x	x	164	250	x	x	173	234	36	52	143	194	39	75
20	x	x	x	x	x	x	x	x	138	220	45	71	191	360	x	x
21	218*	330	x	x	149	222	x	x	x	x	x	x	x	x	x	x
22	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
23	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24	x	x	x	x	x	x	x	x	173*	245	x	x	126*	193	54	68
25	x	x	x	x	x	x	x	x	106a	144a	x	x	141a*	200a	x	x
26	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
27	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
28	144	160	x	x	211	293	x	x	138	168	62	120	107	135	36	50
29	114	148	x	x	165	258	x	x	161*	235	38	75	91	151	25	30
30	121	158	88a	135a	205	252	102a	158a	239*	300	32	63	108	170	36	54
31	x	x	x	x	x	x	x	x	140*	180	34	60	105	170	18	30

* = yellow line observed.
a = index computed from low weight data.
x = no observations.

SOLAR FLARES

DECEMBER 1957

OBSERVATORY	DATE Dec. 1957	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
MITAKA	01	0417 E	0422 D		S15	E27	4288	5 D	1	1	0417	1.34	1.60	1.25	122	
MITAKA	01	0417 E	0424 D		S12	E33	4288	7 D	1	1	0417	1.84	2.26	2.08	118	
MITAKA	01	0424	0436 D	0433	S14	E31	4288	12 D	1	1	0433	2.78	3.36	1.90	131	
MITAKA	01	0532 E	0550	0532	S15	E26	4288	18 D	2	1	0532	4.70	5.69	2.95	196	
ONDREJOV	01	0807 E	0815		S30	E33	4288	8 D	1	3	0812			2.70		
ONDREJOV	01	0827 E	0849		S17	W19	4269	22 D	1	3	0829			1.90		
UCCLE	01	0854	0920 D		S11	W63	4263		1	2						
WENDEL	01	0858	0930		S11	W57	4263	32	1				4.00			
UCCLE	01	0900 E			S18	W22	4269		1+	2						
UCCLE	01	0949	0955 D	0950	S18	W22	4269	6 D	1	2	0950	2.50	2.60			
UCCLE	01	1024	1055	1034	S09	W15	4279	31	2	3	1034	9.40	9.40			
WENDEL	01	1027	1057		S11	W14	4279	30	1				3.00			
ONDREJOV	01	1029 E	1044		S17	W15	4269	15 D	1	1	1029			2.20		
WENDEL	01	1040	1144 D		S14	W73	4257	64 D	1				4.00			
UCCLE	01	1043	1141 D		S12	W80	4257	58 D	2	3		6.00	9.60			
UCCLE	01	1043	1141		S15	W73	4257	58	1+	3		3.00	4.50			
ONDREJOV	01	1047 E	1118		S13	W80	4257	31 D	1+	3	1106			2.70		
USNRL	01	1315	1328	1318	S30	E28	4288	13	1	2	1318	1.13	1.50		89	
WENDEL	01	1316	1333		S32	E25	4288	17	1				3.00			
WENDEL	01	1353	1413		S24	E64	4285	20	1+				5.00			
USNRL	01	1550	1616	1555	S16	W26	4269	26	1	2	1555	.68	.78		109	
MT WILSON	01	1630	1924		S19	W25	4269	174	1							
SAC PEAK	01	1630	1930	1700 U	S18	W25	4269	180	1	2		2.40			18	G-SWF
USNRL	01	1632	1815 D	1647	S18	W25	4269	103 D	1+	2	1647	2.72	3.12		119	
CLIMAX	01	1724 E	1808	1731	S19	W23	4269	44 D	1		1731	3.70				
CLIMAX	01	1928	2038	1944	S22	E14	4272	70	2		1944	6.60				
SAC PEAK	01	1930	2040	1945	S25	E15	4272	70	1+	2		5.40			19	S-SWF
MT WILSON	01	1932	2036		S24	E13	4272	64	1							
UCCLE	02	0857 E	0903	0902	S20	W37	4269	6 D	1	3	0902	2.20	2.70			
UCCLE	02	0906	0911	0907	S24	E16	4288	5	1	3	0907	2.20	2.40			
UCCLE	02	0916	1203 D	0929	N27	E90	4294	47 D	1+	3		2.20	4.60			
UCCLE	02	1009	1050	1023	S31	E17	4288	41	1+	3	1023	4.50	5.00			
UCCLE	02	1051	1105	1158	S32	E16	4288	14	1	3	1058	3.40	3.70			
UCCLE	02	1025	1200	1104	S19	W38	4269	35	2+	3	1104	11.30	14.10			
MEUDON	02	1055	1150	1110	S16	W33	4269	55	2−		1110		12.00			
R O EDIN	02	1058	1140	1103	S17	W35	4269	42	2	2	1103	8.00	10.20	2.83		
CAPRI S	02	1100 E	1139 D		S17	W37	4269	39 D	1	3	1101	2.50	3.30			
R O HERST	02	1102 E	1132		S18	W34	4269	30 D	2	2	1116	8.70	11.00	1.84	86	
ARCETRI	02	1112 E	1145 D		N16	W35	4271	33 D	1+	2						
UCCLE	02	1131	1136	1133	S24	E17	4288	5	1	3	1133	3.40				
UCCLE	02	1145	1203 D	1153	N25	W60	4268	18 D	1+	3	1153	4.50	5.30			
MITAKA	03	0157 E	0203 D		S20	W42	4269	6 D	1+	1	0158	7.57	11.00	1.79	125	
ARCETRI	03	0830 E	0845 D		S19	W49	4269	15 D	1	2	0835	1.80	2.80			
UCCLE	03	0843 E		0916	S19	W50	4269		1	3						
UCCLE	03	0845	0914		N16	W35	4271	29	1	3	0900	3.00	3.00			
UCCLE	03	0933		0935	N16	W35	4271		1	3	0935	2.10	2.10			
UCCLE	03	0940	1051	1051	S19	W50	4269	71 D	1+	3		3.00				
UCCLE	03	1102	1128 D	1110	S20	W50	4269	26 D	2	3	1110	10.00	11.50			
UCCLE	03	1212 E	1228 D		S20	W50	4269	16 D	2+							
OTTAWA	03	1317 E	1325 D		S19	W47	4269	8 D	2	1	1325	3.36	5.35			Slow S-SWF
OTTAWA	03	1350		1354	N13	W37	4271		1	1	1354	1.86	2.41			

SOLAR FLARES

DECEMBER 1957

OBSERVATORY	DATE Dec. 1957	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — UT	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
ZURICH	03	1439	1445 D		S19	W64	4269	6 D	1	1	1440		2.00			
OTTAWA	03	1459	1533		S19	E01	4288	34	1	1	1508	1.91	2.05			
R O HERST	03	1505 E	1530	1510	S19	W03	4288	25 D	1	2	1510	3.30	3.50			
HUANCAYO	03	1546	1625	1547	S18	W51	4269	39	1+	2						Slow S-SWF
HUANCAYO	03	1631	1657	1633	S18	W51	4269	26	1	2						Slow S-SWF
CLIMAX	03	1805	1840	1819	S25	W05	4288	35	1		1819	2.20				
MT WILSON	03	1806	1826		S23	W05	4288	20	1							
MT WILSON	03	2128	2135		N15	W45	4271	7	1							
MITAKA	04	0015	0038	0015	S22	W03	4288	23	1	2	0015	3.71	3.93	1.89	128	
MITAKA	04	0241 E	0303	0241	N13	W45	4271	22 D	2	2	0242	4.70	6.20	2.50	188	
MITAKA	04	0405	0414 D		S18	W04	4288	9 D	1	1	0405	5.67	6.00	1.60	107	
ARCETRI	04	0840 E	0935 D		S20	E80	4297	55 D	2	1						S-SWF
ARCETRI	04	0857 E			S27	W11	4288		1	1						
ARCETRI	04	1000 E			S17	W61	4269		1	1						
UCCLE	04	1047 E	1050		S13	W12	4288	3 D	1	3		2.20				
UCCLE	04	1050	1149	1110	S20	W08	4288	59	1+	3	111	3.40	3.6			
UCCLE	04	1052	1202 D	1140	S13	W02	4288	70 D	2	3	1111	6.00	6.20			
ARCETRI	04	1115 E	1155 D		S10	W10	4288	40 D	1+	1						
CAPRI S	04	1234 E	1244 D		N25	E62	4294	10 D	1	2	1238	1.50	3.40			
R O HERST	04	1232 E	1245		N18	E70	4296	13 D	1	2	1236	1.30	3.20	2.93	87	S-SWF
MEUDON	04	1235 E	1300		N18	E68	4296	25 D	1+	5						
HUANCAYO	04	1656	1704	1658	S20	W18	4288	8	1	1						
TASHKENT	05	0548	0800	0555	S17	W21	4288	132	2+							
SIMEIZ	05	0657 E	0810 D		S22	W21	4288	73 D	3	1	0657	18.20	21.20	2.20		
CAPRI S	05	1014 E	1042 D		N27	E47	4294	28 D	1+	3	1027	2.50	4.00			S-SWF
ARCETRI	05	1020 E	1105		N25	E45	4294	45 D	2	2	1039	3.40	5.40			
ZURICH	05	1345 E	1425		N30	E52	4294	40 D	1	3	1347		3.00			
ZURICH	05	1427	1430	1428	S12	W62	4293	3	1	3	1428		1.00			
HUANCAYO	05	1532 E	1556	1535	S16	E71	4297	24 D	1	2						
HUANCAYO	05	1623 E	1633	1623	S25	W30	4288	10 D	1	3						
OTTAWA	05	1623	1643	1628	S27	W29	4288	20	1	2	1628	2.15	2.77			
USNRL	05	1623	1643	1623	S27	W31	4288	20	1	3	1623	1.36	1.84		90	
HUANCAYO	05	1633	1715	1634	S19	W29	4288	42	1	3						
USNRL	05	1633	1717	1638	S21	W33	4288	44	1+	3	1638	3.06	4.03		107	Slow S-SWF
OTTAWA	05	1633		1636	S21	W31	4288		1+	1	1636	3.13	3.93			
MITAKA	06	0025	0035 D		S34	E65	4301	10 D	1	1	0025	2.78	8.9	2.86		
SYDNEY	06	0345	0440		N16	E52	4296	55	2							
MITAKA	06	0349	0425	0353	N15	E47	4296	36	2	1	0352	15.20	23.20	3.07	149	Slow S-SWF
TASHKENT	06	0401 E	0438		N16	E45	4296	37 D	1+							
KODAIKANAL	06	0404 E	0423		N14	E44	4296	19 D	2	2	0408	3.90	5.90	2.00	150	
WENDEL	06	1250 E	1312 D		S14	W74	4293	22 D	1+				6.00			
HUANCAYO	06	1545	1552	1546	S16	W63	4293	67	1	3						
MT WILSON	06	1845	1850		S15	W80	4293	5	1							
MT WILSON	06	1913	1924		S22	W50	4288	11	1							
MT WILSON	06	1958	2006		S32	W09	4285	8	1							
MT WILSON	07	0000	0030		S22	W45	4288	30	1+							
MITAKA	07	0329	0341 D		S16	W49	4288	12 D	1+	1	0332	5.67	8.03	2.33	120	
MITAKA	07	0453 E	0503		S18	E31	4297	10 D	1	1	0458	1.84	2.32	1.24	115	
MITAKA	07	0532 E	0544	0532	S18	E30	4297	12 D	1+	1	0532	2.78	3.50	2.50	165	
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ONDREJOV	07	0808	0821	0811	S18	E32	4297	13	1+	3	0811			4.30		
WENDEL	07	0812 E	0829		S18	E30	4297	17 D	1+				5.00			
WENDEL	07	0831 E	1000		N16	E31	4296	89 D	1				4.00			
HYDERABAD	07	0859 E	0945	0910	N15	E28	4296	46 D	1	2	0910	1.82	2.14	2.00		
CAPRI S	07	0908 E	0953 D		N20	E29	4296	45 D	1	3	0931	2.00	2.40			
HUANCAYO	07	1613 E	1628	1613	N05	W01	4290	15 D	1	3						
HUANCAYO	07	1633	1659	1635	S14	W60	4288	26	1	3						
ATHENS	08	0814	0904		N35	E21	4298	50	2	4		4.30	5.60			
ATHENS	08	0839	0924 D		N16	E12	4296	45 D	1	4		2.70	2.80			
UCCLE	08	1319	1330 D		N29	E00	4294	11 D	1	3		5.00				
UCCLE	08	1319	1330 D		N08	W15	4290	11 D	1	3		5.00				
UCCLE	08	1324	1332 D	1330	S37	E42	4301	8 D	1	3	1330	2.50	2.70			
OTTAWA	08	1502 E			S16	W73	4288		1+	1	1502	1.91	6.84			
SAC PEAK	08	2142	2200	2145	S15	W85	4293	18	1	2		1.80			17	
MITAKA	09	0201 E	0210	0201	S14	E10	4297	9 D	1+	2	0206	3.80	4.00	1.71	165	
MITAKA	09	0217 E	0225	0217	S19	E08	4297	8 D	1+	2	0222	3.80	4.10	2.66	183	
TASHKENT	09	0542 E	0550		S14	W84	4288	8 D	1+							
ATHENS	09	0701 E	0805		S14	W75	4288	64 D	2	4		1.50	5.30			
ONDREJOV	09	0909 E	0921		S12	W72	4288	12 D	1	2	0910			2.70		
ONDREJOV	09	0952 E	0958		N08	W28	4290	6 D	1	3	0954			2.60		
SAC PEAK	09	1740	1840 U	1747	N07	W29	4290	60 D	1+	2		5.10			22	
MT WILSON	09	1743	1819		N07	W30	4290	36	1+							
HUANCAYO	09	1942 E	1953	1943	N08	W75	4292	11 D	1	2						
SAC PEAK	09	2220	2222 D	2220 D	N27	W15	4294	2 D	1	2		2.40			16	
MT WILSON	09	2220	2245		N30	W14	4294	25	1							
MITAKA	10	0308	0320 D	0312	N07	W33	4290	12 D	1	1	0313	3.71	4.45	1.87	120	
MITAKA	10	0327	0410 D	0332	S13	E44	4303	43 D	1+	1	0340	3.80	5.32	1.24	120	
MITAKA	10	0443	0455 D	0446	S13	E43	4303	12 D	1+	1	0443	5.67	7.94	1.87	134	
UCCLE	10	1002	1113	1037	N08	W40	4290	71	1+	2	1037	3.40	3.90			
UCCLE	10	1004	1009	1006	S33	W57	4285	5	1+	2	1006	2.20	3.40			
UCCLE	10	1011	1025	1015	N28	W22	4294	14	1	2	1015	2.20	2.50			
UCCLE	10	1109	1118	1112	S20	E90	4311	9	1+	3	1112	2.20	4.40			
MITAKA	11	0221	0242		S18	W10	4297	21 D	1	1	0221	3.80	4.03	1.72	120	
SIMEIZ	11	0814 E	0819 D	0816	N08	E08	4296	5 D	1	2	0816	1.40	1.40	2.40		
SYDNEY	12	0255	0350	0310	S32	W12	4302	55	2							
HYDERABAD	12	0258 E	0313		S34	W10	4302	15 D	1	1	0258	3.04	3.68	1.60		
ONDREJOV	12	1214 E	1226	1218	S16	E85	4313	12 D	1+	3	1218			7.80		S-SWF
ONDREJOV	12	1241	1259	1246	N27	W50	4294	18	1	3	1246			5.40		
ONDREJOV	12	1309 E	1320		S25	E62	4311	11 D	1+	3	1313			2.60		
HUANCAYO	12	1612 E	1633	1614	S26	E69	4311	21 D	1	3						
CLIMAX	12	1750	1838	1754	N15	W41	4294	48	2		1754	8.20				
SAC PEAK	12	1757	1840	1805	N17	W42	4294	43	2+	2		9.00			18	Slow S-SWF
USNRL	12	1757	1842	1807	N15	W43	4294	45	2+	2	1807	5.32	7.46		97	
MT WILSON	12	1816 E			N25	W40	4294		1+							
MT WILSON	12	1859	1924		N25	W40	4294	25	1							
USNRL	12	1903	1938	1907	N31	W30	4298	35	1	2	1907	1.81	2.54		82	
USNRL	12	1957	2019 D	2001	N27	W55	4294	22	2	1	2001	2.71	5.60	1.00	80	
CLIMAX	12	2001	2023	2015	N28	W54	4294	22	1		2015	3.60				
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HUANCAYO	12	2050 E	2106	2053	S15	E87	4313	16 D	1	1						
SYDNEY	13	0215 E	0300		N22	E90	4316	45 D								
TASHKENT	13	0450	0523	0455	N28	W52	4294	33	1+							Slow S-SWF
SYDNEY	13	0456	0525	0503	N22	W55	4294	29	2							
USNRL	13	1430	1520	1446	N11	W34	4296	50	1+	3	1446	2.94	3.65		107	
HUANCAYO	13	1627	1633	1629	N17	E90	4314	6	1	2						
USNRL	13	1951	2007	1953	S14	E71	4313	16	1	2	1953	.79	2.54		69	
CAPRI S	14	1245 E	1305 D		N17	E75	4314	20 D	2	1	1245	2.00	9.00			Slow S-SWF
USNRL	14	1255 E	1450 D		N20	E80	4314	115 D	3	1	1257	7.11	35.90			
USNRL	15	1514	1526	1518	N25	E73	4316	12	1	3	1518	.79	3.01		71	
HAWAII	15	1829	1838 D	1832	N12	E61	4314	9 D	1	1	1832	1.20	2.70			Slow S-SWF
HAWAII	15	2002	2102	2006	N12	E61	4314	60	1	1	2006	2.00	4.30			
HAWAII	15	2116	2156	2130	N12	E61	4314	40	1+	1	2130	4.10	9.20			
MITAKA	16	0213 E	0230		S33	E03	4310	17 D	1	2	0213	2.78	3.22	2.29	122	
MITAKA	16	0246	0257		S16	E54	4315	11	1	1	0250	1.84	3.18	1.98	100	
MITAKA	16	0409 E	0413		S25	E22	4311	4 D	1	1	0409	1.84	3.22	2.33	105	
MITAKA	16	0445	0450		N20	E52	4314	5	1+	1	0445	5.67	9.64	2.97	131	
MITAKA	16	0610	0621 D		S25	E21	4311	11 D	1	1	0610	.89	1.08	1.62	96	
ONDREJOV	16	1125	1238	1139	N18	E48	4314	73	2+	3	1139			5.20		
KHARKOV	16	1127 E	1232		N14	E51	4314	65 D	3							Slow S-SWF
CAPRI S	16	1127	1238		N17	E52	4314	71	2	2	1142	4.00	6.40			
R O HERST	16	1143 E	1225	1200	N16	E48	4314	42 D	2	3	1159	6.50	10.00	1.87	81	
ONDREJOV	16	1237 E	1318	1253	S25	E19	4311	41 D	1	3	1253			2.60		
USNRL	16	1256 E	1306 D		S25	E17	4311	10 D	1	1	1256	1.70	1.96			
WENDEL	16	1301 E	1313 D		S25	E11	4311	12 D	1+				6.00			
OTTAWA	16	1532	1607	1535	N20	E33	4314	35	2	2	1535	3.89	4.95			
SAC PEAK	16	2135	2207	2140	S23	E89	4318	32	1+	2		6.40			13	
MITAKA	17	0042 E	0046 D		N14	E39	4314	4 D	1	1	0045	1.84	2.52	2.56	134	
ATHENS	17	0734 E	0908	0737	N22	E44	4314	94 D	2+	3		6.70	10.00			S-SWF
ARCETRI	17	0825 E	0956		N19	E40	4314	91 D	2	2	0843	4.00	5.60			
USNRL	17	1306	1340	1314	N26	W10	4312	34	1+	2	1314	2.84	3.24		99	
HUANCAYO	17	1531 E	1632 D	1532	N17	E33	4314	61 D	2	1						Slow S-SWF
USNRL	17	1532	1634	1543	N17	E33	4314	62	1+	1	1543	2.04	2.58		97	
USNRL	17	1712	1727	1714	N03	W90	4296	15	1+	2	1714	2.16			89	
CLIMAX	17	1812	1829	1817	N07	W90	4296	17	1		1817	4.30				
HYDERABAD	18	0444 E	0528	0451	N17	E26	4314	44 D	1	2	0451	2.43	2.86	2.60		Slow S-SWF
MITAKA	18	0450	0519	0503	N16	E26	4314	29	3	1	0458	15.20	17.80	3.13	227	
ABASTUMANI	18	0620 E		0625	N17	E22	4314		2							Slow S-SWF
HUANCAYO	18	1653	1729 D	1654	S22	E73	4319	36 D	1	2						Slow S-SWF
HAWAII	18	2328	2334 D	2328	N14	E16	4314	6 D	1	1	2328	3.40	3.70			
MITAKA	19	0320 E	0342		N16	E49	4317	22 D	1	2	0326	3.28	5.22	1.58	100	
MITAKA	19	0340	0347		N19	E13	4314	7	1	2	0341	.89	.98	1.74	100	
ATHENS	19	0757 E	0801 D	0801	N22	E17	4314	4 D	2+	3		10.70	12.00			
CAPRI S	19	0812 E	0958		N20	E10	4314	106 D	1+	3	0923	4.50	4.90			S-SWF
ARCETRI	19	0813 E	0845		N19	E15	4314	32 D	2	2	0823	5.80	6.20			
MEUDON	19	0915 E	1015		N21	E16	4314	60 D	1		0915		2.00			

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MEUDON	19	0916	1015	0921	N14	E14	4314	59	1+		0921		5.00			
ARCETRI	19	0918 E	1000 D		N12	E13	4314	42 D	1+	2	0920	3.30	3.60			
SAC PEAK	19	1707	1735	1712	S25	E78	4319	28	1	3		1.90			24	S-SWF
MITAKA	19	2358 E	2403		N23	E69	4321	5 D	1+	1	2358	2.78	8.06	1.64	134	
MITAKA	20	0301 E	0315		N13	W02	4314	14 D	1	1	0308	3.80	3.95	1.65	102	
HYDERABAD	20	0543 E	0606	0545	N15	E01	4314	23 D	1+	1	0545	4.25	4.45	2.50		S-SWF
ARCETRI	20	0828 E	0855 D		N15	E36	4317	27 D	1	2	0855	2.20	2.90			
ARCETRI	20	0850	0920		N19	W01	4314	30	1+	2	0905	2.80	3.00			
WENDEL	20	0850 E	0930	0859	N18	E01	4314	40 D	1+				7.00			
WENDEL	20	0919	0939		N14	E34	4317	20	1				4.00			
WENDEL	20	1022	1059	1034	N16	W05	4314	37	2				12.00			
SCHAUINS	20	1027 E	1048		N15	W06	4314	21 D	2							
CAPRI S	20	1029 E	1048 D		N14	W11	4314	19 D	1+	3	1035	4.00	4.20			
WENDEL	20	1116	1140		N25	E60	4321	24	2				9.00			
CAPRI S	20	1117 E	1130		S26	E60	4322	13 D	1	3	1122	1.00	2.30			
ONDREJOV	20	1124 E	1130		S26	E65	4322	6 D	1	3	1127			2.40		
WENDEL	20	1249 E	1308		N16	W02	4314	19 D	1+				5.00			
WENDEL	20	1316	1341	1329	N16	W03	4314	25	1+				6.00			
WENDEL	20	1343 E	1349 D	1344	N22	E50	4321	6 D	1+				6.00			
CAPRI S	20	1344 E	1350		N24	E49	4321	6 D	1	3	1346	1.50	2.50			
HAWAII	20	2026	2032	2026	N10	E27	4317	6	1	1	2026	2.20	2.50			
HAWAII	20	2110	2122	2112	S12	W17	4313	12	1	1	2112	2.10	2.20			
MITAKA	21	0433 E	0450 D	0438	N24	E42	4321	17 D	1	1	0438	2.78	4.50	2.39	149	
WENDEL	21	0851	0900	0852	S21	E74	4323	9	1				4.00			
WENDEL	21	0945 E	1009		S13	W21	4313	24 D	1				4.00			
WENDEL	21	1036	1051	1038	S18	E85	4323	15	1				4.00			
CAPRI S	21	1210 E	1223 D		N25	E31	4321	13 D	1	2	1213	1.80	2.30			
WENDEL	21	1210	1235	1213	N26	E37	4321	25	1				4.00			
AROSA	21	1212	1225		N25	E36	4321	13	1							
WENDEL	21	1313	1355 D		N24	E41	4321	42 D	1+				7.00			
USNRL	21	1314	1341	1322	S26	E48	4322	27	1+	2	1322	1.36	2.19		106	
ZURICH	21	1320 E	1328		S12	W39	4313	8 D	1	2	1326		3.00			
ZURICH	21	1320 E	1342		S26	E47	4322	22 D	1	2	1323		4.00			
USNRL	21	1431	1450	1433	S14	W23	4313	19	1	2	1433	.79	.88	1.00	95	
USNRL	21	1458	1529	1507	N29	E46	4324	31	1	3	1507	1.25	2.06		89	
SAC PEAK	21	1545	1610	1547	S12	E75	4323	25	1	3		3.20			18	
USNRL	21	1546	1607 D	1548	S20	E73	4323	21 D	2+	2	1548	1.36	4.33		91	
CLIMAX	21	1546	1610	1550	S22	E77	4323	24	1		1550	2.50				
USNRL	21	1614	1644	1616	S19	W38	4313	30	1	3	1616	.68	.91		124	
USNRL	21	1650	1655 D	1653	S14	E67	4323	5 D	1	3	1653	.79	2.10		72	
SAC PEAK	21	1722	1750	1735	N26	E58	4324	28	1	3		2.50			16	
HUANCAYO	21	2045 E	2100	2048	N24	E43	4321	15 D	1	2						
HAWAII	21	2048 E	2056 D	2048	N23	E47	4321	8 D	2	1	2048	4.40	7.40			
HAWAII	21	2100	2116 D	2104	N17	W24	4314	16 D	1	1	2104	3.30	3.80			
HUANCAYO	21	2102 E	2113	2103	N14	W23	4314	11 D	1	2						
SAC PEAK	21	2110	2130	2117	S23	E26	4319	20	1	3		3.80			17	
CLIMAX	21	2110	2134	2117	S20	E37	4319	24	1		2117	3.10				
MT WILSON	21	2128	2136		N31	E24	4317	8	1							
SAC PEAK	21	2147	2210 D	2202	S12	E17	4318	23 D	1+	3		4.50			22	
CLIMAX	21	2150	2233 D	2206	S09	E18	4318	43 D	2		2206	7.80				
HAWAII	21	2156 E	2204 D	2156	S14	E17	4318	8 D	1	1	2156	3.00	3.30			

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MT WILSON	21	2215 E	2221		N25	W02	4316	6 D	1							
MT WILSON	21	2215 E	2230		S14	E24	4318	15 D	1							
MT WILSON	21	2232	2300		N23	E51	4324	28	2							
HAWAII	21	2253 E	2254 D		N24	E52	4324	1 D	3	1	2253	11.30	21.60			
SYDNEY	21	2308 E	2340		N23	E60	4324	32 D	2							
MEUDON	22	1025	1055		N20	W30	4314			3						
WENDEL	22	1027	1101 D	1032	N19	W29	4314	34 D	2				8.00			S-SWF
CAPRI S	22	1031 E	1048		N19	W28	4314	17 D	1	3	1033	2.00	2.40			
WENDEL	22	1031	1054 D		N28	E45	4324	23 D	1				4.00			
WENDEL	22	1057	1123		N27	E48	4324	26	2				9.00			
UCCLE	22	1336	1341	1337	N24	E24	4321	5	1	2	1337	2.40	2.50			
USNRL	22	1443	1518	1446	S26	E34	4322	35	1	2	1446	1.13	1.50		100	
SAC PEAK	22	1605	1635	1607	S15	E60	4323	30	1	2		2.40			14	
SAC PEAK	22	1715	1820	1737	N18	W29	4314	65	1+	2		3.40			18	Slow S-SWF
CLIMAX	22	1727	1821	1735	N19	W32	4314	54	1		1735	5.00				
MT WILSON	22	1734	1800		N17	W34	4314	26	1							
CLIMAX	22	1820	1836	1826	N20	E19	4321	16	1		1826	2.40				
SAC PEAK	22	1820	1837	1825	M21	E19	4321	17	1	2		2.30			16	
CLIMAX	22	1906	1915	1909	S12	W53	4313	9	1		1909	2.20				
HAWAII	22	2240 E	2332	2244	N20	W34	4314	52 D	2	1	2244	4.10	5.40			S-SWF
MITAKA	22	2342 E	2400		N26	E41	4324	18 D	1	2	2342	1.84	2.76	2.10	134	
MITAKA	23	0028	0037	0030	N18	W38	4314	9	2	2	0028	11.40	15.30	2.68	134	Slow S-SWF
HAWAII	23	0028 E	0040	0028	N19	W38	4314	12 D	1	1	0028	2.00	2.90			
HAWAII	23	0038	0048 D	0040	N25	E40	4328	10 D	2	1	0040	3.90	5.60			
MITAKA	23	0039	0052	0039	N26	E40	4328	13	2+	2	0039	7.57	11.50	3.14	204	
MITAKA	23	0206 E	0210	0206	N29	E40	4328	4	1+	2	0206	3.80	6.00	3.11	152	
MITAKA	23	0247 E	0258		N29	E40	4328	11 D	1	1	0254	1.34	2.13	2.21	122	
MITAKA	23	0342	0350		N20	W43	4314	8	1	1	0342	1.84	2.65	1.92	107	
WENDEL	23	0941	0949 D		N20	E06	4321	8 D	1				3.00			
ONDREJOV	23	0954 E	1000		N18	E42	4325	6 D	1	3	0955			2.40		
ONDREJOV	23	1201 E	1220		N24	W19	4317	19 D	1	3	1208			2.30		
USNRL	23	1344	1355	1347	S29	E08	4319	11	1	3	1347	1.02	1.13		124	
USNRL	23	1355	1426	1357	N27	E08	4321	31	2+	3	1357	4.53	5.18		131	
CAPRI S	23	1356 E	1407		N28	E08	4321	11 D	1+	3	1358	4.30	4.70			
USNRL	23	1411	1625	1424	S26	E48	4329	14	2	2	1424	3.29	5.30		76	
USNRL	23	1416	1433	1418	N20	E02	4321	17	1	2	1418	.74	.80		101	
CAPRI S	23	1436	1507		N16	W46	4314	31	1+	3	1451	2.10	3.10			
USNRL	23	1437	1523	1440	N19	W45	4314	46	1+	2	1440	2.38	3.71		114	Slow S-SWF
HUANCAYO	23	1530 E	1710 D	1559	S30	E49	4329	100 D	1+	2						
HUANCAYO	23	1618	1737 D	1652	S13	W59	4313	79 D	1+	2						
USNRL	23	1633	1806	1640	S13	W59	4313	93	1	2	1640	1.48	2.80		78	
USNRL	23	1836 E	1916	1836	N22	E22	4328	40	1	1	1836	.45	.53		109	
HUANCAYO	23	2053 E	2100 D	2055	N20	W80	4312	7 D	1+	2						
USNRL	23	2054	2101 D	2054	N22	W82	4312	7 D	2	2	2054	1.02	7.21		56	
MITAKA	23	2358 E	2405		S19	E36	4323	7 D	1	2	2358	1.84	2.39	1.76	110	
MITAKA	24	0003 E	0005		N30	E30	4328	2 D	1	2	0003	1.84	2.61	1.77	105	
MITAKA	24	0221 E	0234	0227	N21	E03	4321	13 D	1	1	0228	4.62	5.00	1.60	128	
MITAKA	24	0411 E	0427	0412	N21	E02	4321	16 D	1+	1	0412	3.68	4.00	2.44	183	
MITAKA	24	0441	0502	0450	N17	W53	4314	21	1+	1	0449	3.68	6.01	2.33	140	
UCCLE	24	1009	1015		N17	E28	4325	6	1	1		3.10	3.30			

COMMERCE - STANDARDS - BOULDER

SOLAR FLARES

DECEMBER 1957

OBSERVATORY	DATE Dec. 1957	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
UCCLE	24	1100 E	1119		S09	W58	4315	19		3						
HUANCAYO	24	1530 E	1715 D	1543	S05	W54	4315	105 D	1+	2						
MITAKA	25	0048 E	0108	0055	S22	W13	4319	20 D	1+	2	0048	5.67	6.12	1.52	128	
MITAKA	25	0114 E	0145	0131	S08	W59	4315	31 D	1+	2	0125	3.80	6.76	3.13	152	
MITAKA	25	0138	0148		S25	W04	4322	10	1	2	0139	2.78	3.00	1.92	96	
MITAKA	25	0158	0250 D	0203	S16	E01	4322	52 D	2	1	0202	11.50	11.80	2.03	192	
HYDERABAD	25	0435 E	0437 D		S07	W59	4315	2 D	1	1	0435	2.43	4.69	1.50		S-SWF
HYDERABAD	25	0459 E	0533		N17	W59	4314	34 D	1	2	0506	1.22	2.53	1.80		
MITAKA	25	0500 E	0536	0508	N17	W62	4314	36 D	2	1	0510	4.94	9.30	2.93	204	
TASHKENT	25	0634 E	0705		S26	W12	4319	31 D	1+							Slow S-SWF
AROSA	25	0903 E	0920		N18	W63	4314	17 D	1							
SIMEIZ	25	0906 E	0930 D	0915	N19	W65	4314	24 D	1	1	0913	2.80	3.20	2.50		
CAPRI S	25	0910 E	0929		N15	W68	4314	19 D	1+	3	0916	2.00	5.00			
UCCLE	25	0946	0955 D	0950	N20	W70	4314	9 D	1	2						
UCCLE	25	0949	0954	0950	S05	W65	4315	5	1	2						
UCCLE	25	1009	1045	1023	N19	W65	4314	36	1+	3	1023	4.50	7.00			
CAPRI S	25	1023 E	1036 D		N15	W68	4314	13 D	1	3	1025	1.20	3.00			
UCCLE	25	1029	1039	1034	S07	W64	4315	10	1	3	1034	1.50	2.10			
UCCLE	25	1048	1107		N23	W16	4321	19	1	3	1100	2.00	2.10			
UCCLE	25	1100	1107		S05	W65	4315	7	1	3	1103	1.70	2.20			
UCCLE	25	1142	1151	1145	N28	W08	4321	9	1	3	1145	2.00	2.10			
UCCLE	25	1155	1204 D	1158	N30	E07	4328	9 D	1	3	1158	2.00	2.00			
AROSA	25	1156	1200 D		N30	E07	4328	4 D	1							
USNRL	25	1250	1316	1253	N29	E07	4328	26	1+	2	1253	2.95	3.26		111	
AROSA	25	1251	1254		N18	W66	4314	3	1							
WENDEL	25	1251 E	1258		S05	E59	4332	7 D	1				3.00			
USNRL	25	1252	1256	1253	S08	W66	4315	4	1	2	1253	.85	1.96		93	
AROSA	25	1252	1258		N23	W18	4321	6	1							
WENDEL	25	1251 E	1304		N31	E10	4328	13 D	1				4.00			
AROSA	25	1252	1305		N30	E07	4328	13	1							
WENDEL	25	1315	1335		N27	W06	4321	20	1+				5.00			
WENDEL	25	1327	1345 D		S28	E27	4327	18 D	1				3.00			
WENDEL	25	1404	1418 D		N17	E62	4331	14 D	1+				6.00			
USNRL	25	1408 E	1456		N15	W67	4314	48 D	1	1	1416	1.36	3.61			
USNRL	25	1435	1450		S04	W70	4315	15	1	1	1440	1.19	3.39			
CAPRI S	25	1436 E	1442 D		S06	W73	4315	6 D	1	3	1440	2.00	5.20			
SAC PEAK	25	1605	1630	1607	N30	E06	4328	25	1	2		2.80			18	S-SWF
SAC PEAK	25	1812	1900	1822	S07	W70	4315	48	1+	2		4.70			20	Slow S-SWF
CLIMAX	25	2041	2100	2051	N22	W03	4328	19	1		2051	2.20				
CLIMAX	25	2122	2137	2125	S18	E20	4323	15	1		2125	2.20				
WENDEL	26	0912	0944		S07	W78	4315	32	1+				7.00			
ZURICH	26	0914 E	0942		S05	W76	4315	28 D	1	2	0914		2.00			S-SWF
ATHENS	26	0915	0950		S06	W77	4315	35	1	3		.60	2.40			
ONDREJOV	26	0920 E	0935		S07	W78	4315	15 D	1+	3	0920			5.60		
UCCLE	26	1011	1014	1012	N28	W20	4321	3	1	2	1012	2.70				
UCCLE	26	1031	1039		N17	E75	4337	8	1	2	1035	2.00	4.00			
UCCLE	26	1043	1055	1046	N19	W75	4316	12	1+	2	1046	2.50	5.00			
UCCLE	26	1055	1105	1056	S25	W49	4319	10	1	2	1056	2.00	3.00			
UCCLE	26	1119	1130	1123	N26	W10	4321	11	1	3	1123	3.00	3.00			
UCCLE	26	1137	1146	1139	N17	W80	4314	9	1	3	1139					
MEUDON	26	1213	1246	1218	N25	W27	4321	33	1	3	1218		6.00			

SOLAR FLARES

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OBSERVATORY	DATE Dec. 1957	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
MEUDON	26	1219	1250 D		N17	E75	4337	31 D	1	3						
WENDEL	26	1221 E	1240		N18	E72	4337	19 D	1				3.00			
MEUDON	26	1258	1400		N13	W80	4314	62	1+	3						
WENDEL	26	1300 E	1328		N19	W82	4314	28 D	1+				5.00			
ONDREJOV	26	1324	1340	1328	N17	W85	4314	16	1+	3	1328			5.90		
CLIMAX	26	1606	1616	1608	N25	W35	4321	10	1		1608	2.60				
CLIMAX	26	1751	1845	1822	S27	W29	4319	54	2		1822	5.20				
SAC PEAK	26	1811 E	1850 D	1815	S27	W28	4319	39 D	1+	2						Slow S-SWF
MITAKA	27	0204 E	0209 D		N25	W38	4321	5 D	1+	1	0205	5.67	7.77	3.07	120	
ONDREJOV	27	0818	0834	0822	S26	W33	4319	16	1+	3	0822			2.90		
SIMEIZ	27	0819	0909 D	0825	S27	W35	4319	50 D	1+	3	0822	5.90	7.70	2.60		
ATHENS	27	0822	0853	0824	S26	W33	4319	31	1	3		2.70	3.40			
CANBERRA	27	0822	0853		S26	W33	4319	31	1							
AROSA	27	0846 E	0902		S25	W34	4319	16 D	1							
HYDERABAD	27	0913 E	0926	0917	N27	W59	4317	13 D	1	2	0917	2.12	4.88	2.00		
ONDREJOV	27	0914 E	0926		N29	W19	4324	12 D	1+	3	0918			2.60		
WENDEL	27	0916 E	0933		N28	W21	4324	17 D	1+				7.00			
SCHAUINS	27	0916 E	0938		N23	W18	4324	22 D	1+							
SIMEIZ	27	0919	0940 D	0924	N29	W21	4324	21 D	1+	3	0920	4.50	5.60	1.80		
WENDEL	27	0916 E	0952		S18	W06	4323	36 D	2				10.00			
ONDREJOV	27	0917	0938		S19	W05	4323	21	2	3	0918			3.50		
SIMEIZ	27	0922	1005 D	0925	S19	W06	4323	43 D	1+	3	0925	4.10	4.30	2.40		
WENDEL	27	0918	1000 D		S29	W07	4323	42 D	1				4.00			
ONDREJOV	27	0920	0930		S32	W04	4323	10	1	3	0925			2.40		
SIMEIZ	27	0923	1017 D	0926	S31	W07	4323	54 D	1	3	0933	3.60	4.10	1.60		
AROSA	27	1115	1129 D		N21	W52	4317	14 D	1							
ONDREJOV	27	1116	1152	1122	N22	W50	4317	36	2	3	1122			3.00		
WENDEL	27	1117 E	1135		N22	W50	4317	18 D	1+				7.00			
WENDEL	27	1117 E	1214		N19	W54	4317	57 D	1				4.00			
SCHAUINS	27	1138 E	1201		N21	W55	4317	23 D	1							
USNRL	27	1303	1333	1309	N25	W36	4321	30	1	2	1309	1.81	2.54	1.00	82	S-SWF
ONDREJOV	27	1309 E	1316		N25	W37	4321	7 D	1	3	1310			2.00		
ONDREJOV	27	1316 E	1321		N27	W43	4321	5 D	1	3	1317			2.00		
ONDREJOV	27	1322	1341		N27	W43	4321	19	1+	3	1323			2.60		
WENDEL	27	1315	1336 D		S23	W42	4319	21 D	1				3.00			
SCHAUINS	27	1320 E	1334		S22	W51	4319	14 D	1							
USNRL	27	1355	1443	1359	N25	W18	4324	48	1+	2	1359	2.15	2.54		109	
AROSA	27	1357	1415		N25	W14	4324	18	1							
SAC PEAK	27	1607	1625	1615	S23	W44	4319	18	1	3		3.00			18	
CLIMAX	27	1612	1620		S24	W43	4319	8	1		1613	2.60				
USNRL	27	1613	1628	1614	S13	W44	4322	15	1+	2	1614	1.58	2.41		112	
USNRL	27	1629	1752	1638	S13	W44	4322	83	1+	2	1638	2.04	3.12	2.00	96	
MT WILSON	27	2040	2049		N20	W40	4321	9	1							
USNRL	27	2042	2050 D	2042	N22	W38	4321	8 D	1	2	2042	.96	1.36		105	
SAC PEAK	27	2132	2147	2137	S20	W13	4323	15	1	3		2.80			17	
MT WILSON	27	2136 E			S19	W14	4323		1							
HUANCAYO	28	1556	1622	1601	S25	E24	4335	26	1	2						
USNRL	28	1602 E	1623 D	1606	S23	E20	4335	21 D	1	2	1606	2.04	2.33	1.00	93	
MT WILSON	28	2229	2331		N25	W50	4321	62	2							S-SWF
AROSA	29	0836 E	0840		S19	W35	4323	4 D	1							

SOLAR FLARES

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OBSERVATORY	DATE Dec. 1957	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
USNRL	29	1430	1516	1440	S07	W17	4326	46	1	2	1440	2.10	2.15		80	
HUANCAYO	29	1615	1622	1618	N21	W61	4321	7	1	2						
HAWAII	30	0102	0117 D	0106	N24	W60	4321	15 D	2	1	0106	5.40	12.30			
MITAKA	30	0119 E	0126		N21	W67	4321	7 D	1	2	0122	1.34	3.35	3.26	96	
WENDEL	30	1119	1137		N20	W48	4325	18	1&				6.00			
AROSA	30	1150	1155		N26	W79	4321	5	1							
USNRL	30	1602	1705 ·	1609	S20	W50	4323	63	2&	3	1609	3.61	6.15	2.00	134	
HUANCAYO	30	1604	1702 D	1609	S20	W51	4323	58 D	2	2						Slow S-SWF
SAC PEAK	30	1605	1700	1612	S20	W51	4323	55	1&	2		3.60			24	
USNRL	30	1707	1736	1708	S20	W50	4323	29	1	2	1708	.96	1.61		97	
HUANCAYO	30	1708 E	1724	1710	S20	W50	4323	16 D	1	2						
USNRL	30	2016	2042	2030	N21	E52	4338	26	1	1	2018	1.02	1.92			
MITAKA	31	0002	0051	0011	S22	W12	4333	49	1&	2	0002	9.47	10.00	1.79	149	
HAWAII	31	0017 E	0020 D		S23	W15	4333	3 D	1&	1	0020	5.20	5.60			
MITAKA	31	0056	0106		N19	E50	4338	10	1	2	0056	1.84	3.35	1.44	131	
CLIMAX	31	2128	2217	2135	S18	E46	4340	49	1		2135	2.40				
AROSA	31	1113	1128 D		S24	W16	4333	15 D	1							
R O EDIN	31	1122 E	1200		S22	W20	4333	38 D	1	1	1125	4.00	4.50	1.72		
CAPRI S	31	1156 E	1215		S07	W14	4332	19 D	1	3	1200	2.00	2.00			
AROSA	31	1218 E	1232		S07	W15	4332	14 D	1							
AROSA	31	1346	1408		S20	W67	4323	22	1							
AROSA	31	1408	1435 D		S24	W17	4333	27 D	1							
USNRL	31	1411	1517	1413	S24	W18	4333	68	1	1	1430	4.07	4.65			
SAC PEAK	31	1535	1610	1545	S24	W19	4333	35	1	2		2.70			23	
USNRL	31	1538	1625	1542	S24	W18	4333	47	1&	2	1542	2.15	2.42	1.00	105	
CLIMAX	31	2059	2156	2122	S25	W21	4333	57	1		2122	4.60				

CAPRI S — ANACAPRI SWEDISH
KODAIKNL — KODAIKANAL
KRASNYA — KRASNAYA PAKHRA
R O EDIN — ROYAL OBSERVATORY, EDINBURGH
R O HERST — GREENWICH ROYAL OBSERVATORY, HERSTMONCEUX
SAC PEAK — SACRAMENTO PEAK
SCHAUINS — SCHAUINSLAND
USNRL — UNITED STATES NAVAL RESEARCH LABORATORY

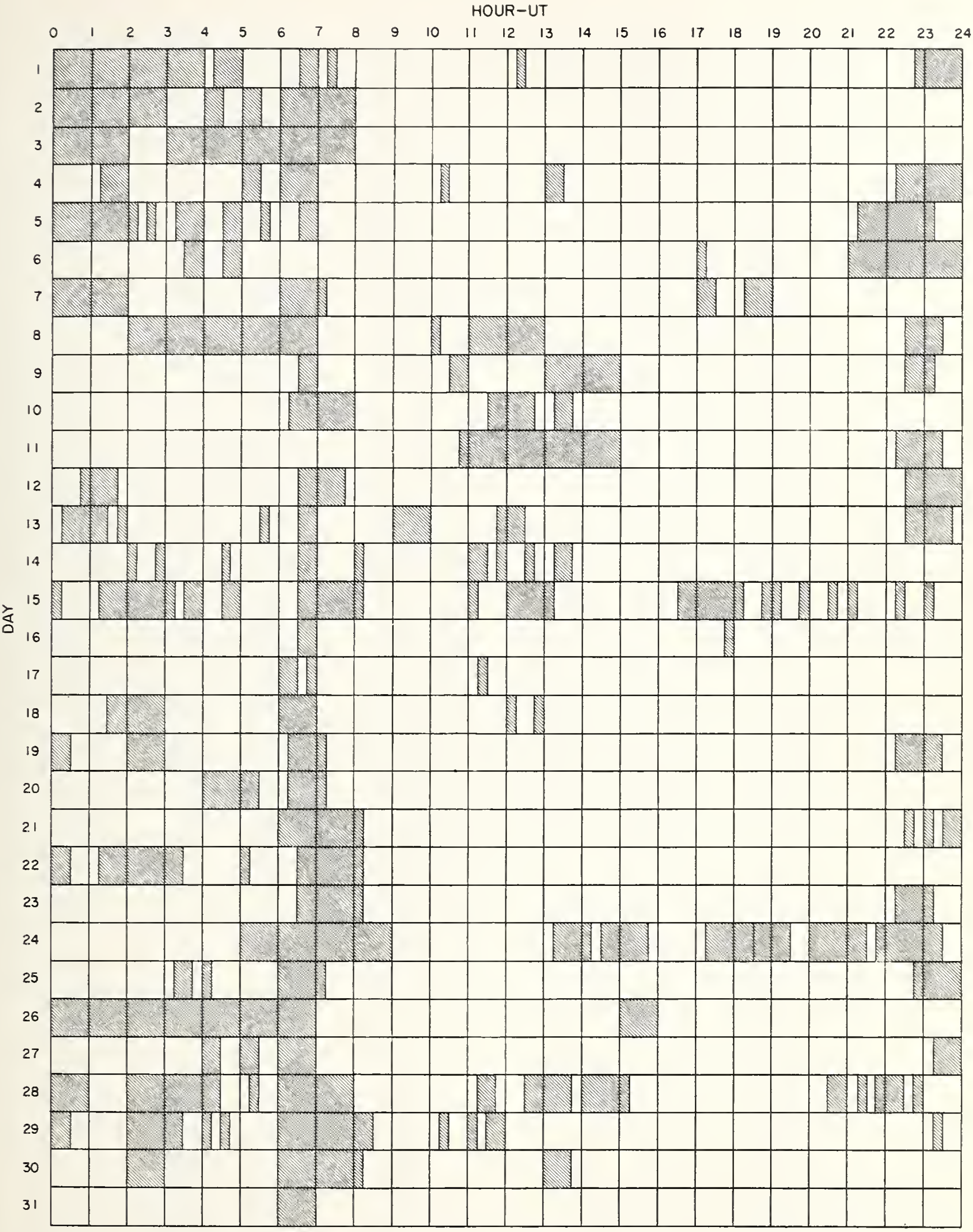
* RATED AS IMPORTANCE 1- BY OTHER OBSERVATORIES

SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E - LESS THAN
D - GREATER THAN
U - APPROXIMATE
& - PLUS
- - MINUS

INTERVALS OF NO FLARE PATROL OBSERVATIONS

DECEMBER 1957



Stations included:

COMMERCE – STANDARDS – BOULDER

Anacapri (Swedish)
Arcetri
Arosa
Athens
Climax
Dunsink
Greenwich Royal Observatory,
Herstmonceux

Hawaii
Huancayo
Kodaikanal
Meudon
Mitaka
Nizamiah
Ondrejov

Ottawa
Royal Observatory, Edinburgh
Sacramento Peak
Simeis
Uccle
U.S. Naval Research Laboratory
Zurich

SUBFLARES NOTED AS FOLLOWS, DATE - UNIVERSAL TIME - COORDINATES

NOVEMBER 1957

WENOEL	01	0917 E	S18 E38
WENOEL	01	0932 E	S26 W01
WENOEL	01	1052 E	S19 E57
OTTAWA	01	1329	S24 W00
OTTAWA	01	1403	S15 E57
SAC PEAK	01	1617	S15 W45
*SAC PEAK	01	1657	S18 E57
*OTTAWA	01	1659	S14 E56
SAC PEAK	01	1807	N23 W70
SAC PEAK	01	2032	S18 E55
SAC PEAK	01	2110	S14 W45
SAC PEAK	01	2130	S18 E52
SAC PEAK	01	2145	S14 W45
*CAPRI S	02	1534 E	S17 W21
WENDEL	03	1023 E	N23 W37
WENOEL	03	1035 E	S15 W33
WENOEL	03	1107 E	S15 W34
WENOEL	03	1130 E	S19 W33
WENDEL	03	1149 E	S27 W33
SAC PEAK	03	1820	S15 W42
WENOEL	04	0937 E	N27 E53
WENOEL	04	1020 E	S23 W40
*CLIMAX	04	1732	S25 W44
*SAC PEAK	04	1745 E	S25 W45
*CLIMAX	04	1946	N23 W57
CLIMAX	04	2133	N23 W57
UCCLE	05	1121	S15 E08
USNRL	05	1231	S34 E80
CLIMAX	05	2054	N24 W64
HAWAII	05	2220	S20 W01
UCCLE	06	1125	S15 W02
OTTAWA	06	1354	N19 E35
USNRL	06	1527	S18 W09
SAC PEAK	06	1547	N17 E35
*SAC PEAK	06	1550	S26 W70
OTTAWA	06	1554	N19 E34
*SAC PEAK	06	1757	S25 W80
SAC PEAK	06	1820	S25 W80
CLIMAX	06	1841	N19 E66
HAWAII	06	2018	S19 W80
USNRL	06	2021	N18 E32
SAC PEAK	06	2022	N16 E32
HAWAII	06	2024	N12 E33
USNRL	06	2057	S30 E45
SAC PEAK	06	2155	N17 E63
UCCLE	07	1124	N30 W03
USNRL	07	1548	N19 E52
USNRL	07	1548	S34 E31
USNRL	07	1559	S31 E30
SAC PEAK	07	1605 U	S34 E29
USNRL	07	1617 E	S24 E90
USNRL	07	1706	S25 E90
USNRL	07	1915	N36 W08
SAC PEAK	07	1940	S25 E90
USNRL	07	1942	S24 E90
USNRL	07	1942	S19 W18
USNRL	07	2044	S24 E90
*CAPRI S	08	1013 E	S22 E73
HUANCAYO	08	1632 E	S27 E16
SAC PEAK	08	1810	N37 W17
SAC PEAK	08	1955	N17 E37
CLIMAX	08	1959	N18 E38
*CLIMAX	08	2002	S26 E90
WENOEL	09	1233 E	S32 E06
USNRL	09	1233	S34 E06
WENDEL	09	1242 E	N28 W29
*SAC PEAK	09	1510	S16 E65
*USNRL	09	1511	S15 E66
SAC PEAK	09	1537	N37 W28
USNRL	09	1539	N31 W27
SAC PEAK	09	1605	N16 W88
SAC PEAK	09	1625	N06 E63
SAC PEAK	09	1630	S15 W50
SAC PEAK	09	1735	N21 E37
SAC PEAK	09	1750	N20 E36
CLIMAX	09	1820	N24 E32
SAC PEAK	09	1820	N22 E32
SAC PEAK	09	1827	N20 E36
CLIMAX	09	1844	S19 W47
SAC PEAK	09	1845	S20 W48
CLIMAX	09	2205	N21 E34
SAC PEAK	09	2205	N20 E33
WENOEL	10	1005 E	N06 E53
*CAPRI S	10	1010 E	S19 E35
WENOEL	10	1153 E	N05 E52
USNRL	10	1345	S20 E33
OTTAWA	10	1448	S18 E34
USNRL	10	1451	S20 E32
SAC PEAK	10	1607	S20 W55
SAC PEAK	10	1627	N07 E45
SAC PEAK	10	1805	N20 E36
SAC PEAK	10	1807	S22 E32
SAC PEAK	10	1837 E	N21 E35
CLIMAX	10	1855	N21 E33
CLIMAX	10	2020	N20 E34
SAC PEAK	10	2059 E	S22 E32
USNRL	11	1520	S24 E35
USNRL	11	1602	S20 E41
CLIMAX	11	1813	S21 E20
CLIMAX	11	2004	N22 E20
HAWAII	11	2004	N19 E21
HAWAII	11	2108	N17 W02
CAPRI S	12	1042 E	S10 W10
HUANCAYO	12	1542 E	S19 E19
USNRL	12	1558	S20 E09
USNRL	12	1715	S21 E09
*SAC PEAK	12	1915	S17 W90
HAWAII	12	2022	N23 W15
SAC PEAK	12	2035	S18 W85
HAWAII	12	2254	S22 W03
HYDERABAO	13	0323	S15 W80
ATHENS	13	0627	N18 W17
ATHENS	13	0629	N16 W14
OTTAWA	13	1337	S22 W02
USNRL	13	1338	S22 W04
*CAPRI S	13	1510	S17 W09
SAC PEAK	13	1855	S22 W05
*SAC PEAK	13	1952	S26 E15
*USNRL	13	1953	S25 E16
WENOEL	14	0804 E	S17 W10
CAPRI S	14	0808 E	S19 W12
WENDEL	14	0939 E	S14 W19
WENOEL	14	1040 E	S20 W14
WENDEL	14	1343 E	S07 E54
USNRL	15	1322	N08 W18
USNRL	15	1332	S09 E45
USNRL	15	1350	N30 E60
USNRL	15	1354	S18 W33
USNRL	15	1357	N06 W21
USNRL	15	1408	N14 W45
SAC PEAK	15	1422 E	S17 W33
USNRL	15	1507	S11 E37
USNRL	15	1538	N08 W26
SAC PEAK	15	1550	N07 W20
USNRL	15	1610	N06 W20
SAC PEAK	15	1745	N15 E28
SAC PEAK	15	1905	S18 W37
USNRL	15	1926	S17 W36
USNRL	15	1926	N08 W28
SAC PEAK	15	1927 E	N08 W27
USNRL	15	1946	S07 E37
USNRL	15	2038	N08 W28
ATHENS	16	0730 E	N07 W32
WENOEL	16	0932 E	S04 E22
*ATHENS	17	0832	N28 E22
*CAPRI S	17	0834	N29 E27
WENDEL	17	0943 E	S18 W66
*CAPRI S	17	1143 E	N29 E26
*CAPRI S	17	1240 E	N15 E02
USNRL	17	1256 E	N15 E06
CAPRI S	17	1422 E	N29 E24
USNRL	17	1436	N35 E32
USNRL	17	1443	N12 E03
USNRL	17	1455	N31 E30
USNRL	17	1547	N30 E30
ATHENS	18	0718 E	N28 E24
*WENOEL	18	0855 E	N27 E24
UCCLE	18	0937	N16 E40
UCCLE	18	1007	S27 E55
UCCLE	18	1040	N08 W60
WENOEL	18	1040 E	N08 W63
UCCLE	18	1045	S16 E75
HUANCAYO	18	1535 E	N20 W77
SAC PEAK	18	1810	S16 W61
SAC PEAK	18	1827	S22 W52
SAC PEAK	18	1830	N07 W67
SAC PEAK	18	2100	N15 E31
SAC PEAK	19	1825	S16 E54
SAC PEAK	19	1840	S28 E90
WENOEL	20	1201 E	N19 E09
WENOEL	20	1255 E	N14 W42
USNRL	20	1343 E	N12 E06
USNRL	20	1409	N13 W39
USNRL	20	1437	N15 E03
OTTAWA	20	1443	N14 W41
USNRL	20	1446	N15 W42
*SAC PEAK	20	1450	N14 W36
*USNRL	20	1451	N15 W38
SAC PEAK	20	1502	S09 W31
*USNRL	20	1503	N23 W09
USNRL	20	1503	S08 W33
OTTAWA	20	1504	S13 E43
OTTAWA	20	1504	S09 W33
USNRL	20	1505	S14 E42
USNRL	20	1514	N14 W37
USNRL	20	1540	N18 E07
OTTAWA	20	1542 E	N18 E09
SAC PEAK	20	1615	N15 W43
USNRL	20	1618	N15 W42
USNRL	20	1704	N27 W10
*SAC PEAK	20	1740	S16 E78
SAC PEAK	20	1820	N17 E02
HAWAII	20	1820	N16 E03
SAC PEAK	20	1857	N18 E01
USNRL	20	1900	N19 E02

SUBFLARES NOTED AS FOLLOWS, DATE - UNIVERSAL TIME - COORDINATES

NOVEMBER 1957

USNRL	20	1954	N18 E08
SAC PEAK	20	2107	N08 E40
WENDEL	21	0950 E	N20 W03
WENDEL	21	1158 E	N16 W08
USNRL	21	1245	N20 W09
WENDEL	21	1323 E	N13 W52
USNRL	21	1340	N11 W90
USNRL	21	1403	N16 W09
SAC PEAK	21	1456	S14 E51
USNRL	21	1548	N26 W36
SAC PEAK	21	1609	N18 W06
SAC PEAK	21	1611	S18 E52
USNRL	21	1612	N18 W08
SAC PEAK	21	1629	S11 E23
USNRL	21	1631 E	S10 E23
SAC PEAK	21	1654	S19 E73
USNRL	21	1658	S15 E70
SAC PEAK	21	1721	N27 W23
USNRL	21	1727	N27 W25
SAC PEAK	21	1802	N19 W11
USNRL	21	1802	N20 W12
SAC PEAK	21	1850	S16 E52
SAC PEAK	21	1912	S12 E21
USNRL	21	1915	S10 E20
USNRL	21	1931	N26 E21
SAC PEAK	21	2155	S11 E10
WENDEL	22	0953 E	S10 E13
WENDEL	22	1039 E	S08 E11
WENDEL	22	1308 E	N10 E17
*OTTAWA	22	1356 E	N12 E17
UCCLE	23	0844 E	N28 W58
UCCLE	23	0907 E	N21 W34
UCCLE	23	1027	N14 W85
UCCLE	23	1033	N21 W34
*WENDEL	23	1120 E	S14 E27
WENDEL	23	1207 E	S10 W02
WENDEL	23	1210 E	S11 W30
WENDEL	23	1327 E	N24 W58
WENDEL	23	1332 E	N19 W34
WENDEL	23	1344 E	S10 E40
SAC PEAK	23	1500 E	S10 E38
*SAC PEAK	23	1610	S11 E38
SAC PEAK	23	1650	S27 E63
SAC PEAK	23	1720	N16 W41
SAC PEAK	23	1730	S30 E64
SAC PEAK	23	1815	S11 E37
SAC PEAK	23	1835	S27 E62
SAC PEAK	23	2055	S16 E35
SAC PEAK	23	2125	S13 E38
SAC PEAK	23	2200	S30 E62
WENDEL	24	1035 E	N20 W48
UCCLE	24	1038 E	S13 E37
UCCLE	24	1039	S15 E31
*WENDEL	24	1135 E	S13 E22
UCCLE	24	1139	N25 W50
UCCLE	24	1156	N27 W50
USNRL	24	1403	N15 W53
SAC PEAK	24	1455	S15 E24
SAC PEAK	24	1455	S14 W13
SAC PEAK	24	1522	N34 W64
SAC PEAK	24	1522	N32 E61
CLIMAX	24	1745	S26 E49
SAC PEAK	24	1745	S26 E47
SAC PEAK	24	1817	S12 E12
SAC PEAK	24	1825	S16 E24
SAC PEAK	24	2152	S26 E47
ATHENS	25	0801	N13 W56
SAC PEAK	25	1442	S14 W26
SAC PEAK	25	1512	S16 E16
*SAC PEAK	25	1547	S15 W01
*SAC PEAK	25	1552	N15 W67
SAC PEAK	25	1722	S16 W25
SAC PEAK	25	1855	S16 E12
SAC PEAK	25	1857	S20 E90
SAC PEAK	25	1930	S15 E15
CLIMAX	25	1931	S15 E15
HAWAII	25	1932	S18 E12
HUANCAYO	25	1932	S16 E15
SAC PEAK	25	2012	S15 E15
HUANCAYO	25	2013 E	S16 E15
HAWAII	25	2014	S18 E12
SAC PEAK	25	2120	S15 E13
CLIMAX	25	2156	S16 E12
SAC PEAK	25	2207	S15 E13
HAWAII	25	2212	S18 E12
*CAPRI S	26	0915 E	S32 E28
WENDEL	26	0924 E	S18 E05
WENDEL	26	1128 E	S16 W36
WENDEL	26	1147 E	S13 W16
ARCETRI	26	1241 E	N18 W01
*WENDEL	26	1345 E	N23 W26
SAC PEAK	26	1439 E	S20 E90
*SAC PEAK	26	1445	S15 W13
SAC PEAK	26	1505	S14 W20
SAC PEAK	26	1525	S15 E03
SAC PEAK	26	1525	S30 E26
*OTTAWA	26	1527	S13 E04
*OTTAWA	26	1528	S27 E26
CLIMAX	26	1624	S17 W01
SAC PEAK	26	1630	S16 E37
*CLIMAX	26	1658	S16 W41
*SAC PEAK	26	1700	S17 W39
*USNRL	26	1702	S18 W40
CLIMAX	26	1803	S17 00
CLIMAX	26	2020	S17 00
USNRL	26	2030	S18 W01
USNRL	26	2043	S15 W01
SAC PEAK	26	2100	S10 W48
USNRL	26	2102	S09 W48
SAC PEAK	26	2130	S10 W48
SAC PEAK	26	2202	S13 W43
WENDEL	27	1153 E	S10 W57
WENDEL	27	1207 E	S21 E33
WENDEL	27	1253 E	S25 E68
WENDEL	27	1351 E	S17 E72
USNRL	27	1359	S18 E72
HUANCAYO	27	1532 E	S17 E69
SAC PEAK	27	1617	S18 E73
HUANCAYO	27	1620	S17 E69
SAC PEAK	27	1630	S13 W25
HUANCAYO	27	1632	S17 E69
*SAC PEAK	27	1700	S15 W16
SAC PEAK	27	1717	S06 E75
SAC PEAK	27	1725	S18 E73
SAC PEAK	27	1745	S15 W12
USNRL	27	1752 E	S12 W26
USNRL	27	1752 E	S15 W11
CLIMAX	27	1757	S20 E90
SAC PEAK	27	1757	S20 E90
USNRL	27	1800 E	S20 E90
SAC PEAK	27	1825	S07 E75
SAC PEAK	27	1842	S17 W54
*USNRL	27	1918	S29 E10
SAC PEAK	27	2007	S06 W75
*SAC PEAK	27	2030	S14 W18
SAC PEIK	27	2050	S20 E85
SAC PEAK	27	2140	S06 E74
ATHENS	28	0814 E	N06 E61
WENDEL	28	1357 E	S17 E16
SAC PEAK	28	1510	S18 E15
SAC PEAK	28	1640	S15 E64
HUANCAYO	28	1641 E	S11 E61
SAC PEAK	28	1647	S10 W40
SAC PEAK	28	1812	S21 E16
SAC PEAK	28	1955	S23 E70
HUANCAYO	28	1958	S21 E68
*SAC PEAK	28	2035	S23 E68
HAWAII	28	2112	S10 W28
SAC PEAK	28	2120	S14 W27
SAC PEAK	28	2135	S23 E68
USNRL	29	1423	S13 E52
USNRL	29	1455 E	S27 W14
*SAC PEAK	29	1535	S15 E52
*USNRL	29	1544	S13 E52
USNRL	29	1635	S18 E01
*USNRL	29	1635	S17 W08
*SAC PEAK	29	1635	S19 W09
*SAC PEAK	29	1715	S14 E48
*USNRL	29	1738 E	S12 E49
USNRL	29	2007	S12 E55
CLIMAX	29	2042 E	S02 E46
USNRL	29	2045	S03 E45
UCCLE	30	0914	S12 W55
UCCLE	30	1145	S21 W35
WENDEL	30	1332 E	S28 E75
SAC PEAK	30	1627	S17 E37
HUANCAYO	30	1628	S15 E37
SAC PEAK	30	1822	N16 E02
*CLIMAX	30	2115	S18 W11
SAC PEAK	30	2157	S19 W17

* Rated as flare of importance ≥ 1 by other observatories (See CRPL-F 160 Part B).

COMMERCE - STANDARDS - BOULDER

SOLAR FLARES

NOVEMBER 1957

OBSERVATORY	DATE Nov. 1957	OBSERVED UNIVERSAL TIME START	OBSERVED UNIVERSAL TIME END	OBSERVED UNIVERSAL TIME MAX. PHASE	LOCATION APPROX. LAT.	LOCATION APPROX. MER. DIST.	LOCATION McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEASUREMENTS MEAS. AREA Sq. Deg.	MEASUREMENTS CORR. AREA Sq. Deg.	MEASUREMENTS MAX. WIDTH Hα	MEASUREMENTS MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
{TASHKENT	02	0907	0954		S20	W16	4207	47	2							
{UTRECHT	02	0932 E	0941 D		S15	W25	4207	9 D	2&							
ABASTUMANI	06	0838 E					4207		2							S-SWF
MT WILSON	08	2001	2009		S23	E79	4237	8	1							S-SWF
MT WILSON	09	1755	1800		N20	E32	4230	5	1							
TASHKENT	10	0607	0624		S25	E61	4237	17	2							S-SWF
TASHKENT	10	0657 E	0723		S25	E69	4237	26 D	2							S-SWF
MT WILSON	10	1941	2148		S21	E30	4236	127	1							
TASHKENT	11	0400 E	0500		S21	E25	4236	60 D	1&							
{ALMA ATA	11	0625	0649		S24	E52	4237	24	2&							
{TASHKENT	11	0633 E	0640		S24	E45	4237	7 D	1&							Slow S-SWF
SYDNEY	15	0525 E	0600		N22	W35	4230	35 D	2							G-SWF
SIMEIZ	16	0723	0755		N08	W34	4233	32	1&							
SIMEIZ	16	0807	0820		N08	W34	4233	13	1&							
MT WILSON	20	1737			S10	E70	4257		1							
SYDNEY	22	0405	0447		N25	W25	4246	42	2							S-SWF
MOSCOW	23	0752	0912	0804	N25	W55	4246	80	3							S-SWF
SIMEIZ	24	0917			S13	E36	4263		2							
TASHKENT	24	1005 E	1020		S13	E53	4267	15 D	2							
MT WILSON	24	1818			S12	E13	4257		1							
MT WILSON	24	2025	2106		N18	W52	4246	41	1							
MT WILSON	26	2251	2305		S20	W05	4257	14	1							
MT WILSON	27	1805	1808		S27	W20	4264	3	1							
MT WILSON	27	1900	1959		S26	E05	4265	59	1							
MT WILSON	27	2034	2052		S15	W18	4263	18	1							
MT WILSON	28	1704			S13	E60	4272		1							Slow S-SWF
MT WILSON	28	2123	2142		S15	W28	4263	19	1							
MT WILSON	29	1729	1801		S16	E50	4272	32	1							Slow S-SWF

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

NOVEMBER 1957

Nov. 1957	Start UT	End UT	Type	Wide Spread Index	Importance	Observation Stations	Known Flare, UT CRPL-F 160B
01	0647	0709	S-SWF	1	1	NE	
01	1630	1730	G-SWF	3	1	MC, PR	1700E
02	0914	0940	S-SWF	5	2-	DA, HH, NE, PU, CW$\overset{**}{***}$	0907
05	0947	1015	S-SWF	4	1+	HH, NE, PU	
05	1207	1221	S-SWF	5	2+	BE, DA, HH, HU, NE, PR, PU, SW, CW$\overset{**}{***}$, RCA*	1205E
06	0833	0902	S-SWF	5	3-	DA, NE, PU, CW$\overset{**}{***}$	0835
07	1940	2000	S-SWF	5	2	BE, HU, MC, PR, WS	
08	1014	1030	S-SWF	1	1	NE	1014
08	1830	1915	Slow S-SWF	5	2-	BE, HU, MC, PR, WS	
08	2003	2018	S-SWF	5	1	BE, HU, MC, PR, WS	2001
08	2328	0122	S-SWF	1	3-	AN	
10	0607	0625	S-SWF	5	1	NE, OK	0607
10	0657	0718	S-SWF	5	1	NE, OK, PU, TO, CW+	0653E
11	0623	0648	Slow S-SWF	5	1	CA, NE, TO	0625
11	1417	1440	S-SWF	5	1+	BE, CR, HU, MC, NE, PR	1410
12	1835	1857	G-SWF	4	1	HU, MC, PR, WS	
12	1903	1920	G-SWF	4	1	AD, BE, HU, MC, WS	
13	0458	0513	S-SWF	3	1	CA, OK	
13	0834	0855	S-SWF	3	3?	HH, CW**	0812
14	0112	0212	G-SWF	3	1	PR, TO	
14	1415	1500	G-SWF	3	1	HU, MC, PR	
15	0527	0618	G-SWF	3	1-	AN, OK	0529
15	2338	2400	S-SWF	4	1-	AN, PR	
17	0538	0554	Slow S-SWF	1	1-	OK	0539E
17	1420	1430	S-SWF	1	1	NE	
18	0105	0123	S-SWF	4	1+	AN, TO	
18	0618	0653	Slow S-SWF	5	2	OK, TO, CW+	
20	0040	0138	Slow S-SWF	5	2	AD, CA, OK, TO	
20	1000	1050	S-SWF	1	3	NE	*
21	0210	0230	S-SWF	4	1+	AD, TO	*
21	1443	1525	Slow S-SWF	4	1	BE, MC, PR, WS	1435
21	1835	1938	Slow S-SWF	4	2+	BE, MC, PR, WS	
22	0406	0439	S-SWF	5	3-	CA, OK, TO, CW+	0409E
22	2238	2308	Slow S-SWF	3	1+	AD, AN	*
23	0757	0837	S-SWF	5	2	DA, HH, NE, PU, TO, CW$\overset{**}{***}$, CW++	0752
24	0901	0933	S-SWF	5	3-	DA, NE, PU, CW$\overset{**}{***}$	0848
24	1107	1123	S-SWF	4	1	DA, NE	
26	0908	0928	Slow S-SWF	5	2	NE, TO	0911
26	1232	1254	S-SWF	5	2	HH, NE, PU	
27	1704	1721	Slow S-SWF	5	1	BE, CR, MC, PR	1704
28	0350	0430	G-SWF	4	1+	AN, TO	
28	0552	0625	S-SWF	1	2-	TO	
28	1418	1445	Slow S-SWF	3	1	HU, PR	1418E
28	1700	1720	Slow S-SWF	3	1	HU, PR	1704
29	1720	1740	Slow S-SWF	3	1	HU, PR	1716E

* No known flare patrol at this time.

CA - Canberra, Australia.
CR - Cornell University, N.Y.
DA - Darmstadt, G.F.R.
HH - Heinrich Hertz Institute, Berlin.
NE - Nederhorst den Berg, Netherlands.
PU - Prague, Czech.

TO - Hiraiso Radio Wave Observatory, Japan.
CW** - Cable and Wireless, Somerton, England.
CW*** - Cable and Wireless, Brentwood, England.
CW+ - Cable and Wireless, Hongkong.
CW++ - Cable and Wireless, Singapore.
RCA* - RCA Communications, Inc., Riverhead, N.Y.

SOLAR RADIO EMISSION

OUTSTANDING OCCURRENCES

DECEMBER 1957

OTTAWA 2800 MC

Dec. 1957	Type*	Start UT Hrs:Mins	Duration Hrs:Mins	Maximum Time UT Hrs:Mins	Maximum Peak Flux	Remarks
1	6 Complex	16 33	17	16 35	90	
	4 Post Increase		1 55		15	
1	3 Simple 3	19 30	1	19 45	12	
1	1 Simple 1	20 43.9	1	20 44.4	7	
3	3 Simple 3 A	13 10	3	13 17	20	
	2 Simple 2	13 41	3.5	13 42.5	46	
	1 Simple 1	13 50	1	13 50.3	7	
	3 Simple 3	15 00	20	15 06.5	20	
4	2 Simple 2	12 35.8	1.2	12 36.3	35	In sunrise.
4	2 Simple 2	15 21.3	1.5	15 21.8	12	
4	8 Group (2)	16 54	35			
	1 Simple 1	16 54	3	16 55.5	6	
	2 Simple 2	16 57.5	1.5	16 58	97	
	4 Post Increase		30		8	
5	2 Simple 2	16 23	1	16 23.5	10	
5	2 Simple 2	16 33	5	16 35	80	
	4 Post Increase		37		10	
5	1 Simple 1	19 35	1	19 35.5	7	
6	1 Simple 1	15 38.6	1	15 39	7	
7	1 Simple 1	15 11.4	1.5	15 12.1	5	
10	2 Simple 2	13 37.3	1.2	13 38	8	
12	6 Complex	17 57	12	18 03.9	94	
	4 Post Increase		27		15	
13	2 Simple 2	16 10.3	0.7	16 10.5	12	
13	2 Simple 2 f	18 23	0.7	18 23.3	22	
14	8 Group (8)	b12 35	>3 24.5			
	- Record incomplete	b12 35	>45		1000*	In sunrise.
	2 Simple 2	13 46	5.5	13 48	72	
	6 Complex	13 56.5	9	14 01.5	21	
	2 Simple 2	14 08.5	12	14 10.5	31	
	2 Simple 2	14 22	8	14 25.5	9	
	2 Simple 2 f	14 51.5	10	14 53	12	
	1 Simple 1	15 28	3	15 29.5	3	
	2 Simple 2	15 43.5	16	15 48	84	
14	1 Simple 1	16 38	4	16 39	3	

SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES

OTTAWA — DECEMBER 1957 — 2800 MC

Dec. 1957	Type*	Start UT Hrs:Mins	Duration Hrs:Mins	Maximum		Remarks
				Time UT Hrs:Mins	Peak Flux	
16	1 Simple 1	16 44.5	3	16 46	6	
16	3 Simple 3 f	16 57.5	10	16 58.5	6	
16	2 Simple 2	17 14.7	1.5	17 15	14	
17	2 Simple 2	13 33.3	4	13 35	9	
17	8 Group (2)	15 30	54			
	2 Simple 2	15 30	9	15 32	72	
	3 Simple 3	15 39	45	15 57	9	
18	6 Complex	16 52	20	17 00.5	18	
18	1 Simple 1	18 07	3	18 08.5	6	
19	8 Group (2)	13 10.7	2.3			
	2 Simple 2	13 10.7	0.5	13 11	20	
	2 Simple 2	13 12	1	13 12.5	20	
19	2 Simple 2 f	17 09.5	5	17 10.9	56	
	4 Post Increase		25		8	
20	2 Simple 2	13 42.9	3	13 43.7	40	
20	2 Simple 2	14 57	1.5	14 57.2	17	
20	2 Simple 2	16 24.5	4	16 26.2	67	
	4 Post Increase A		9		8	
	1 Simple 1	16 30.5	1	16 31	4	
21	2 Simple 2 f	15 46	4	15 47	215	
	4 Post Increase		6		6	
21	2 Simple 2 f	16 14.4	0.8	16 14.7	48	
21	2 Simple 2	16 36.6	0.4	16 36.8	25	
21	1 Simple 1	17 23.5	5	17 25.1	7	
22	2 Simple 2	14 53	2.5	14 53.5	16	
22	3 Simple 3 A	15 55	1	16 12	14	
	8 Group (2)	16 07	23.7			
	2 Simple 2	16 07	4	16 08.3	26	
	6 Complex f	16 20.7	10	16 23	42	
22	3 Simple 3 A	17 10	>3 30	indet.	18	
	8 Group 2	17 16	25			
	2 Simple 2 f	17 16	9	17 18	224	
	2 Simple 2 f	17 32	9	17 35.2	160	
23	3 Simple 3 A	13 43	3	15 00	30	
	8 Group (4)	13 44	1 16			
	2 Simple 2 f	13 44	3	13 44.5	30	
	2 Simple 2 f	13 55.6	7	13 56.4	205	
	6 Complex	14 17	9	14 22.5	17	
	6 Complex f	14 37	23	14 47	155	

SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES
DECEMBER 1957

OTTAWA 2800 MC

Dec. 1957	Type*	Start UT Hrs:Mins	Duration Hrs:Mins	Maximum Time UT Hrs:Mins	Maximum Peak Flux	Remarks
23	2 Simple 2	18 35.2	1.5	18 35.6	20	
24	2 Simple 2	13 20	2	13 21	10	
24	8 Group (2)	16 57.4	9.5			
	2 Simple 2	16 57.4	2.5	16 58.1	12	
	2 Simple 2	17 04.9	2	17 05.4	9	
24	1 Simple 1	18 11	4	18 12.3	6	
	2 Simple 2	20 04.2	3	20 05.2	28	
25	2 Simple 2	13 29.5	2	13 30	25	
25	2 Simple 2	13 39	1	13 39.3	8	
25	6 Complex	14 03.8	5	14 06	15	
25	2 Simple 2	16 06.5	2	16 07.5	18	
25	3 Simple 3 A	16 27	19	16 34	8	
	8 Group (2)	16 28	12			
	2 Simple 2	16 28	3	16 29.2	26	
	2 Simple 2 f	16 34	6	16 35	445	
25	6 Complex	18 15.6	7	18 18.3	185	
	4 Post Increase		23		10	
26	2 Simple 2	13 27.5	2.5	13 28	25	
26	2 Simple 2	16 06	2.5	16 06.3	39	
26	2 Simple 2	17 22.8	5	17 24	21	
26	2 Simple 2	18 15.2	3	18 16	19	
26	2 Simple 2	19 14.8	1	19 15	10	
27	3 Simple 3	13 53.5	10	13 55.5	16	
27	2 Simple 2	16 11.9	2.5	16 12.9	68	
28	2 Simple 2	19 45.2	1.5	19 45.5	35	
29	2 Simple 2	16 16.7	0.5	16 17	13	
29	1 Simple 1	17 49	0.7	17 49.2	4	
30	2 Simple 2	16 07	5	16 09	21	
	4 Post Increase		30		8	
30	6 Complex	17 05.5	5	17 08	26	
31	3 Simple 3 f	15 38.5	15	15 39.3	9	

* Maximum reached during this period.

OTTAWA

2800 MC

HOURS OF OBSERVATIONS: OCTOBER, NOVEMBER, DECEMBER 1957

OBSERVING PERIOD: October 1145 UT - 2155 UT (approx.)
November 1225 UT - 2105 UT (approx.)
December 1255 UT - 2100 UT (approx.)

with the following exceptions:

(1) Variations in time of start of observations:

Oct. 20	1520
Dec. 8	1630
Dec. 16	1550

(2) Variations in time of end of observations:

Oct. 19	1750

(3) Records obscured by interference:

Oct.	2	1825 - 1845
	3	1715 - 1730
		1825 - 1850
	10	2000 - 2010
	17	1850 - 1905
	30	1820 - 1835
Nov.	7	2005 - 2020
	27	1645 - 1710
		1800 - 1820
Dec.	5	1825 - 1840
	19	1945 - 2015

SOLAR RADIO EMISSION

DAILY DATA

DECEMBER 1957

CORNELL — 200 MC

Dec. 1957	Flux Density $10^{-22}w\ m^{-2}(c/s)^{-1}$ Hours UT 12–15	15–18	18–21	Variability 0 to 3 Hours UT 12–15	15–18	18–21	Observing Periods Hours UT
1	[[49	57]	--	[[1	1]	--	1320-1705
2	[[24	24	35]	[[2	2	2]	1335-2105
3	[[20	20	19]	[[2	2	1]	1340-2030
4	[[17	[19	19]	[[2	[2	2]	1330-1430, 1555-1945
5	[[23	24	25]	[[2	2	2]	1330-2040
6	[[21	19	15]	[[2	2	1]	1330-2100
7	[[12	13]	--	[[1	1]	--	1350-1700
8	[[13	13]	--	[[0	1]	--	1330-1700
9	[[11	11	11]	[[1	0	1]	1330-2105
10	[[11	11	11]	[[0	0	1]	1330-1935
11	[[10	12	12]]	[[1	1	0]]	1340-1910
12	[[12	11	12]]	[[0	1	1]]	1430-2100
13	[[13	12	12]	[[1	1	1]	1340-2000
14	[[11	11]	--	[[1	0]	--	1330-1700
15	[[18	20]	--	[[2	2]	--	1320-1700
16	[[15	12	14]	[[2	1	1]	1340-2045
17	[[19	33	50]	[[1	1	1]	1335-2105
18	[[101	85	82]	[[1	2	1]	1345-2055
19	[[119	114	93]]	[[2	2	1]]	1340-1850
20	[[119	229	--	[[2	2	--	1340-1800
21	[[93	127]]	--	[[2	3]]	--	1335-1700
22	--	--	--	--	-	--	
23	--	48	39]]	--	1	1]]	1500-1610, 1620-1830
24	--	[16	15]	--	[1	1]	1550-2130
25	--	16	18]	--	1	1]	1510-2120
26	[[20	20	33]	[[2	2	1]	1340-1555, 1615-2100
27	--	[21	24]	--	[2	2]	1555-2100
28	[[24	27]	--	[[2	2]	--	1350-1705
29	[[45	41]	--	[[1	1]	--	1330-1700
30	[[24	36	25]	[[1	1	1]	1340-2105
31	[[16	16	15]	[[1	1	1]	1330-2100

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SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES
DECEMBER 1957

CORNELL 200 MC

Dec. 1957	Type Ap.J	Start UT	Time of Maximum	Duration Minutes	Type IAU	Max. Flux Density 10^{-22}w $m^{-2}(c/s)^{-1}$ Inst.	Smooth	Remarks
1	3	1605	1606.5	2.5	CA	>224	59	
2	2	1421		6	ECA			
7	3	1517.5		2	ECD	>54	> 29	off-scale 1517.5-18 UT
8	3	1504.5		1.5	ECD	>54	> 28	off-scale 1504.5-05 UT
9	2	1842.5		5.5	ECD	>54	> 32	
10	2	1811		2	CD	>54	25	
12	2	1758		13.5	ECD	>54	>29	off-scale 1759.5-1800 UT
	3	2046		2	CD	>54	>29	off-scale 2046.5-47.5 UT
13	3	1827.5	1827.5	1	CD	>54	>28	
	3	1920		1	CD	>54	>28	
17	3	1621		.5	CA	>224	>102	
20	0	1433		194	E			
23	3	1622		2	CD	>224	> 82	off-scale 1622.5, 1623-23.5 UT
25	8	1635		5	ECD	>224	>120	off-scale 1635-37, 1638, 1638.5-39.5 UT
	3	1815		3.5	ECD	>224	>124	off-scale 1816.5-17 UT
	3	1821.5		3.5	ECD	>224	>124	off-scale 1823-23.5 UT
	2	2029		4	CD	>224	>136	
31	2	1752.5		2.5	CA	>54	>19	
	3	2017	2017.5	1	ECA	>54	28	

SOLAR RADIO EMISSION

DAILY DATA

DECEMBER 1957

CORNELL 200 MC

Dec. 1957	Flux Density 10^{-22}w m^{-2}(c/s)$^{-1}$ Hours UT 12-15	15-18	18-21	Variability 0 to 3 Hours UT 12-15	15-18	18-21	Observing Periods Hours UT
1	[[49	57]	--	[[1	1]	--	1320-1705
2	[[24	24	35]	[[2	2	2]	1335-2105
3	[[20	20	19]	[[2	2	1]	1340-2030
4	[[17	[19	19]	[[2	[2	2]	1330-1430, 1555-1945
5	[[23	24	25]	[[2	2	2]	1330-2040
6	[[21	19	15]	[[2	2	1]	1330-2100
7	[[12	13]	--	[[1	1]	--	1350-1700
8	[[13	13]	--	[[0	1]	--	1330-1700
9	[[11	11	11]	[[1	0	1]	1330-2105
10	[[11	11	11]	[[0	0	1]	1330-1935
11	[[10	12	12]]	[[1	1	0]]	1340-1910
12	[[12	11	12]]	[[0	1	1]]	1430-2100
13	[[13	12	12]	[[1	1	1]	1340-2000
14	[[11	11]	--	[[1	0]	--	1330-1700
15	[[18	20]	--	[[2	2]	--	1320-1700
16	[[15	12	14]	[[2	1	1]	1340-2045
17	[[19	33	50]	[[1	1	1]	1335-2105
18	[[101	85	82]	[[1	2	1]	1345-2055
19	[[119	114	93]]	[[2	2	1]]	1340-1850
20	[[119	229	--	[[2	2	--	1340-1800
21	[[93	127]]	--	[[2	3]]	--	1335-1700
22	--	--	--	--	-	--	
23	--	48	39]]	--	1	1]]	1500-1610, 1620-1830
24	--	[16	15]	--	[1	1]	1550-2130
25	--	16	18]	--	1	1]	1510-2120
26	[[20	20	33]	[[2	2	1]	1340-1555, 1615-2100
27	--	[21	24]	--	[2	2]	1555-2100
28	[[24	27]	--	[[2	2]	--	1350-1705
29	[[45	41]	--	[[1	1]	--	1330-1700
30	[[24	36	25]	[[1	1	1]	1340-2105
31	[[16	16	15]	[[1	1	1]	1330-2100

COMMERCE — STANDARDS — BOULDER

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SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES
DECEMBER 1957

CORNELL — 200 MC

Dec. 1957	Type Ap.J	Start UT	Time of Maximum	Duration Minutes	Type IAU	Max. Flux Density $10^{-22} w\ m^{-2}(c/s)^{-1}$ Inst.	Smooth	Remarks
1	3	1605	1606.5	2.5	CA	>224	59	
2	2	1421		6	ECA			
7	3	1517.5		2	ECD	>54	> 29	off-scale 1517.5-18 UT
8	3	1504.5		1.5	ECD	>54	> 28	off-scale 1504.5-05 UT
9	2	1842.5		5.5	ECD	>54	> 32	
10	2	1811		2	CD	>54	25	
12	2	1758		13.5	ECD	>54	>29	off-scale 1759.5-1800 UT
	3	2046		2	CD	>54	>29	off-scale 2046.5-47.5 UT
13	3	1827.5	1827.5	1	CD	>54	>28	
	3	1920		1	CD	>54	>28	
17	3	1621		.5	CA	>224	>102	
20	0	1433		194	E			
23	3	1622		2	CD	>224	> 82	off-scale 1622.5, 1623-23.5 UT
25	8	1635		5	ECD	>224	>120	off-scale 1635-37, 1638, 1638.5-39.5 UT
	3	1815		3.5	ECD	>224	>124	off-scale 1816.5-17 UT
	3	1821.5		3.5	ECD	>224	>124	off-scale 1823-23.5 UT
	2	2029		4	CD	>224	>136	
31	2	1752.5		2.5	CA	>54	>19	
	3	2017	2017.5	1	ECA	>54	28	

SOLAR RADIO EMISSION

DAILY DATA
NOVEMBER 1957

BOULDER — 450 MC

Nov. 1957	Flux Density $10^{-22}w\ m^{-2}(c/s)^{-1}$ Hours UT 0-3	12-15	15-18	18-21	21-24	Day	Variability 0 to 3 Hours UT 0-3	12-15	15-18	18-21	21-24	Day	Observing Periods Hours UT
1	-	-	-	-	-	-	-	-	-	-	-	-	13.5-23.2,N1
2	-	-	-	-	-	-	-	-	-	-	-	-	13.5-14.9,16.3-23.7
3	-	-	-	-	-	-	-	-	-	-	-	-	13.5-23.7
4	-	-	-	-	-	-	-	-	-	-	-	-	14.1-16.8,19.8-23.7
5	-	-	-	-	-	-	-	-	-	-	-	-	13.6-23.7
6	-	-	-	-	75	-	-	-	-	-	OS	-	21.3-23.6
7	-	-	68	69	75	70	-	0	0	1	OS	0	13.7-23.6
8	-	-	77	73	72	74	-	0	1	1	OS	1	13.7-23.6
9	-	-	73	72	72	72	-	0	0	1	0	0	13.7-23.6
10	-	-	71	72	73	72	-	0	0	0	0	0	13.8-23.6
11	-	-	80	71	68	73	-	2	OS	0	OS	OS	13.8-23.6
12	-	-	77	79	76	77	-	0	1	0	1S	OS	13.8-23.6
13	-	-	72	72	73	72	-	0	0	0	OS	0	13.8-23.5
14	-	-	76	73	72	74	-	0	0	0	OS	0	13.8-23.5
15	-	-	72	71	74	72	-	0	0	0	OS	0	13.8-23.5
16	-	-	75	75	-	74	-	-	OS	1	OS	OS	13.8-21.1,22.4-23.5
17	-	-	73	72	72	72	-	0	0	0	OS	0	14.3-23.5
18	-	-	80	70	71	73	-	0	OS	OS	OS	OS	13.9-23.4
19	-	-	73	72	73	72	-	0	OS	OS	OS	OS	13.9-23.4
20	-	-	73	76	73	73	-	OS	OS	OS	OS	OS	13.9-23.4
21	-	-	80	74	71	75	-	0	OS	0	OS	OS	13.9-23.3
22	-	-	78	69	75	73	-	0	1S	OS	OS	OS	14.0-23.3
23	-	-	77	71	76	75	-	0	OS	0	OS	0	14.0-23.3
24	-	-	79	121	70	92	-	0	2	3	1	1	14.0-23.3
25	-	-	83	69	71	75	-	0	OS	2S	OS	OS	14.0-23.3
26	-	-	86	80	82	82	-	OS	1S	OS	OS	OS	14.1-15.0,15.8-23.3
27	-	-	81	78	-	79	-	0	2S	1S	OS	1S	14.1-23.3
28	-	-	86	71	76	78	-	0	0	0	0	0	14.1-23.3
29	-	-	90	101	105	96	-	0	1S	OS	OS	OS	14.1-23.3
30	-	-	79	78	75	77	-	0	OS	0	0	0	14.6-23.3
31													

Note 1. November 1 thru 2000 U.T. November 6, 1957, medians not measured, receiver unstable.

SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES
NOVEMBER 1957

BOULDER 450 MC

Nov. 1957	Type Ap.J	Start UT	Time of Maximum	Duration Minutes	Type IAU	Max. Flux Density $10^{-22} w\ m^{-2} (c/s)^{-1}$ Inst.	Smooth	Remarks
7	1	1340 B	1945.3	595 D	M	360	-	N2. S
7	3	1942.0	1942.2	00.3	ESD	470	-	
8	1	1340 B	1551.5	595 D	M	330	-	S
8	3	2002.7	2003.3	00.6	ECD	770	-	
11	4	1418	1418.0	222	ECD	2000	16	S
12	6	1345 B	1606.2	590 D	CA	280	14	S Burst 2103.1
18	0	1500	1539	77	CD	95	4	S
21	0	1505.1	1507.1	3.1	CD	140	9	S
22	3	1759.4	1759.8	00.9	ECD	420	-	
24	6	1400 B	1938.6	390 D	CA	140	17	S
24	2	1612.1	1614.1	3.1	ECD	1300	260	S
24	9A	1810	1819.1	22	CD	> 5900	1300	I
24	9B	1832	1834 X	54	CD	> 3600	360	I N3
25	6	1400 B	1954.5	560	CA	300	17	S
25	3	1940.7	1940.9	00.6	ESD	670	-	
25	3	2013.2	2013.5	00.4	ESD	680	-	
26	6	1405 B	1711.0	555 D	CA	450	17	S I 1500-1548
27	6	1405 B	2018.8	555 D	CA	320	15	S
27	2	1657	1707.3	14	CD	440	72	S
28	0	1405 B	1635	160 D	CA	100	23	
29	6	1405 B	1755.4	555 D	CA	480	38	S
30	1	1433 B	2213.9	522 D	M	170	-	S

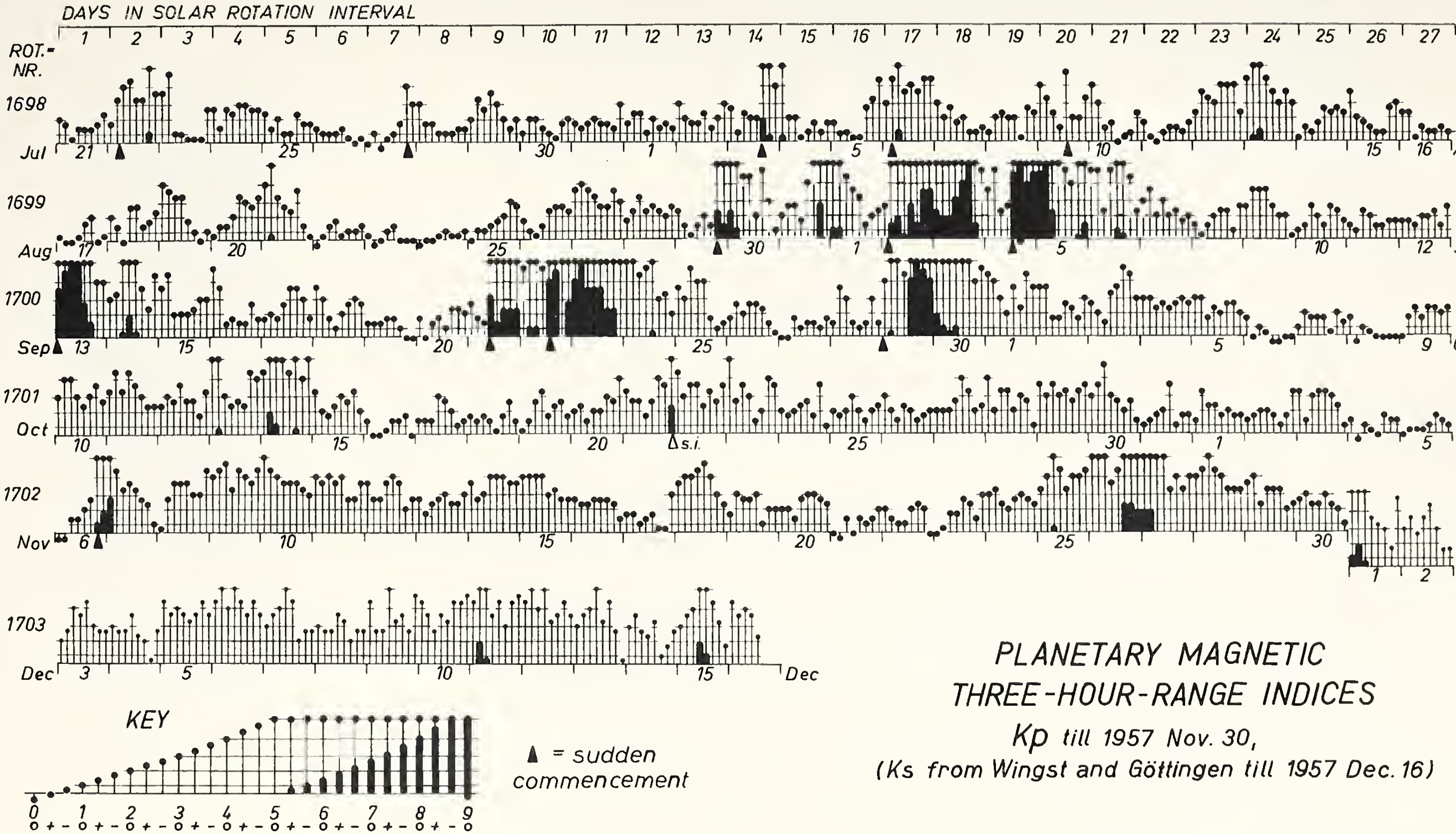
COMMERCE — STANDARDS — BOULDER

Notes:
1. Interference may occasionally obscure or be mistaken for solar events.
2. November 1, 1957 at 2041.5 very intense burst of type 3 (or ESD) duration approximately 2 minutes. Flux not measurable, receiver unstable.
3. November 24 large burst at 1923.1.

GEOMAGNETIC ACTIVITY INDICES

NOVEMBER 1957

Nov. 1957	C	Values Kp: Three hour Gr. interval 1 2 3 4	5 6 7 8	Sum	Ap	Final Selected Days
1	0.4	1+ 3+ 2+ 2+	2- 2o 2- 2-	16+	8	Five
2	0.4	1+ 2- 2o 2o	2- 1o 2- 3+	15-	7	Quiet
3	0.7	3+ 1+ 3o 3+	3+ 3o 2+ 1o	21-	13	
4	0.1	1+ 0o 1o 1-	0+ 2- 1+ 1+	8-	4	4
5	0.2	0+ 1- 1- 1-	1o 2- 1+ 1o	7+	4	5
						17
6	1.3	0o 0o 1+ 1+	2o 3- 6- 6+	19+	24	21
7	1.2	7o 4+ 3+ 4-	3+ 3- 2+ 1o	28-	31	22
8	1.5	1- 3- 4- 4-	4- 3o 3o 4+	25-	18	
9	1.3	4o 4+ 5- 3+	4+ 4o 4- 4+	33-	29	
10	1.2	5o 4+ 4o 4-	4- 4- 3+ 3o	31-	26	
11	1.1	4o 4- 4o 4-	4o 3- 3- 4-	28+	21	Five
12	1.0	4- 3- 3- 4-	4o 4- 2o 3-	25o	17	Disturbed
13	0.8	3- 2- 2+ 3-	3o 2+ 2+ 3o	20o	11	
14	1.1	4- 3- 3o 4o	4o 4o 4- 4-	29-	22	9
15	1.0	4o 4o 4o 4o	3o 3+ 3- 3-	28-	21	25
						26
16	0.6	3- 2+ 2+ 3-	3- 3- 2+ 1+	19o	10	27
17	0.2	2- 2- 1o 1+	2- 1- 1- 3o	12-	6	28
18	1.2	4- 4o 4o 4+	5- 4o 3o 2+	30o	25	
19	0.6	2- 3o 3- 3-	3o 1o 2o 2o	18o	10	
20	0.7	2o 2o 1+ 3-	3o 3o 3- 2+	19o	10	
21	0.2	0+ 0o 1+ 0+	1+ 1o 1+ 2o	8-	4	Ten
22	0.2	2o 1+ 1o 1o	2o 2+ 2o 0+	12o	6	Quiet
23	0.4	0+ 1- 2- 2-	3- 2+ 1+ 3o	14-	7	
24	0.8	3o 3+ 2+ 2o	3- 3o 3- 2+	21+	12	1
25	1.3	3+ 4o 5+ 4+	3+ 4o 4o 4+	33-	30	2
						4
26	1.8	5o 5o 5o 4-	4+ 7- 7- 6+	43-	64	5
27	1.5	6+ 6+ 5o 5o	3+ 4o 3+ 4o	37+	47	17
28	1.2	4o 4+ 5o 4+	4o 3+ 3+ 3+	32-	28	19
29	0.9	4- 4o 2+ 3+	3+ 3+ 2o 2+	24+	16	21
30	0.6	3- 3o 2+ 2+	3o 2+ 2o 1o	19-	10	22
						23
						30
Mean:	0.85			Mean:	18	



PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1957 Nov. 30,
(Ks from Wingst and Göttingen till 1957 Dec. 16)

J.B.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

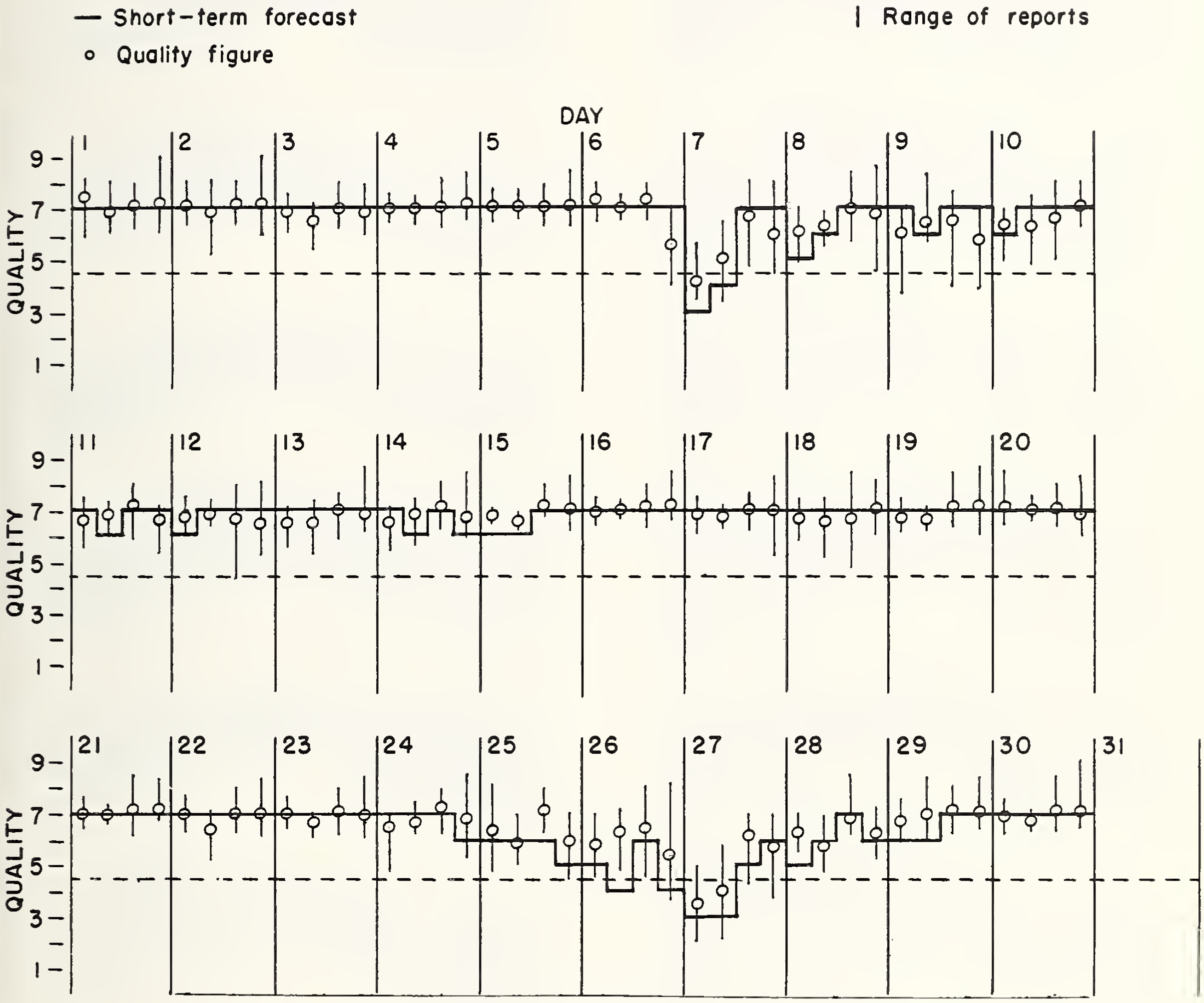
NORTH ATLANTIC

NOVEMBER 1957

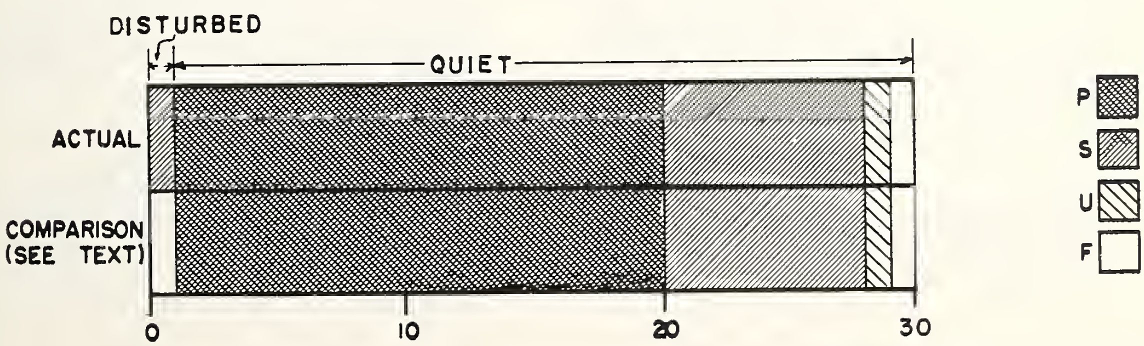
Nov. 1957	North Atlantic 6-hourly quality figures				Short-term forecasts issued about one hour in advance of:				Whole day index	Advance forecasts (J-reports) for whole day; issued in advance by:			Geomagnetic K_{Fr}	
	00 to 06	06 to 12	12 to 18	18 to 24	00	06	12	18		1-4 days	4-7 days	8-25 days	Half Day (1)	Half Day (2)
1	7+	7o	7+	7+	7	7	7	7	7+	7	7		2	2
2	7o	7o	7+	7+	7	7	7	7	7o	7	7		2	2
3	7o	7-	7o	7o	7	7	7	7	7-	7	7		3	2
4	7o	7o	7o	7+	7	7	7	7	7o	7	7		0	1
5	7o	7o	7o	7+	7	7	7	7	7o	7	7		1	2
6	7+	7o	7+	6-	7	7	7	7	7-	7	7		1	(4)
7	4+	5o	7-	6o	3	4	7	7	5+	7	7		(4)	2
8	6+	6+	7o	7-	5	6	7	7	7-	6	7		3	3
9	6+	7-	7-	6o	7	6	7	7	6+	7	7		3	3
10	6+	6+	7-	7o	6	7	7	7	7-	7	7		(4)	3
11	7-	7-	7o	7-	7	6	7	7	7-	7	7		3	3
12	7-	7o	7-	7-	6	7	7	7	7-	7	7		3	3
13	7-	7-	7o	7o	7	7	7	7	7-	7	7		2	2
14	7-	7-	7o	7-	7	6	7	6	7-	6	7		3	(4)
15	6+	7-	7+	7o	6	6	7	7	7-	6	6		3	3
16	7o	7o	7+	7+	7	7	7	7	7o	7	5		2	2
17	7o	7-	7o	7o	7	7	7	7	7o	7	5		1	1
18	7-	7-	7-	7o	7	7	7	7	7-	7	5		3	3
19	7-	7-	7+	7+	7	7	7	7	7o	7	7		2	2
20	7o	7o	7o	7o	7	7	7	7	7o	7	7		2	2
21	7o	7o	7o	7o	7	7	7	7	7o	7	7		1	1
22	7o	6+	7o	7o	7	7	7	7	7-	7	7		1	2
23	7o	7-	7o	7o	7	7	7	7	7o	7	7		1	3
24	7-	7-	7+	7-	7	7	7	6	7-	7	7		2	3
25	6+	6o	7+	6o	6	6	6	5	6+	7	7		(4)	3
26	6o	6+	7-	5+	5	4	6	4	6o	3	7		(4)	(5)
27	3+	4o	6+	6-	3	3	5	6	(4+)	3	7		(5)	3
28	6+	6o	7-	6+	5	6	7	6	6+	5	7		(4)	3
29	7-	7o	7o	7o	6	6	7	7	7o	6	6		3	2
30	7-	7-	7o	7o	7	7	7	7	7o	6	6		2	2
Score: Quiet Periods				P	22	20	27	23		19	18			
				S	6	8	3	7		8	7			
				U	0	0	0	0		1	4			
				F	0	1	0	0		1	0			
Disturbed Periods				P	1	0	0	0		0	0			
				S	1	1	0	0		1	0			
				U	0	0	0	0		0	0			
				F	0	0	0	0		0	1			

( ) represent disturbed values.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS
NORTH ATLANTIC
NOVEMBER 1957

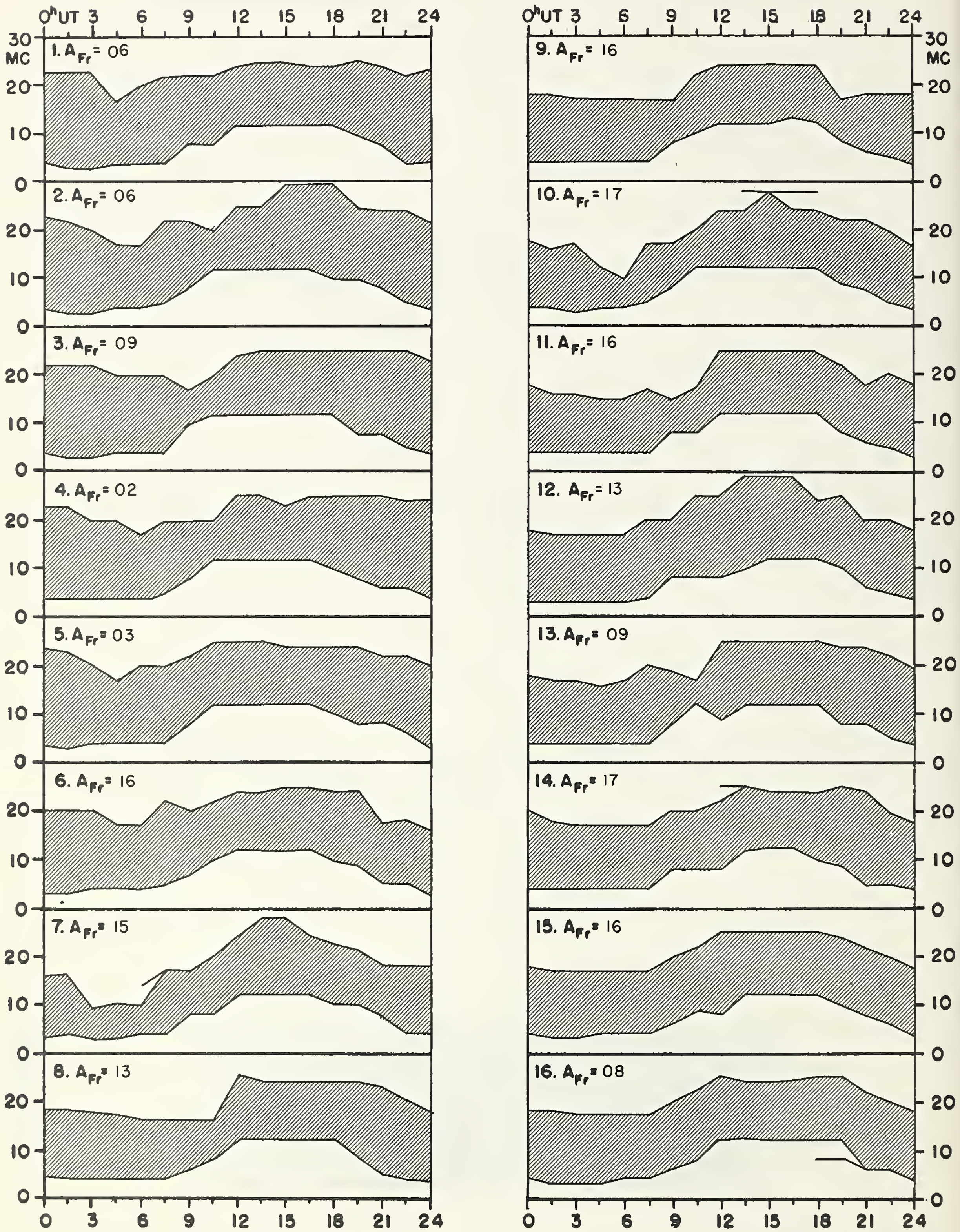


OUTCOME OF ADVANCED FORECASTS 1 TO 4 DAYS AHEAD



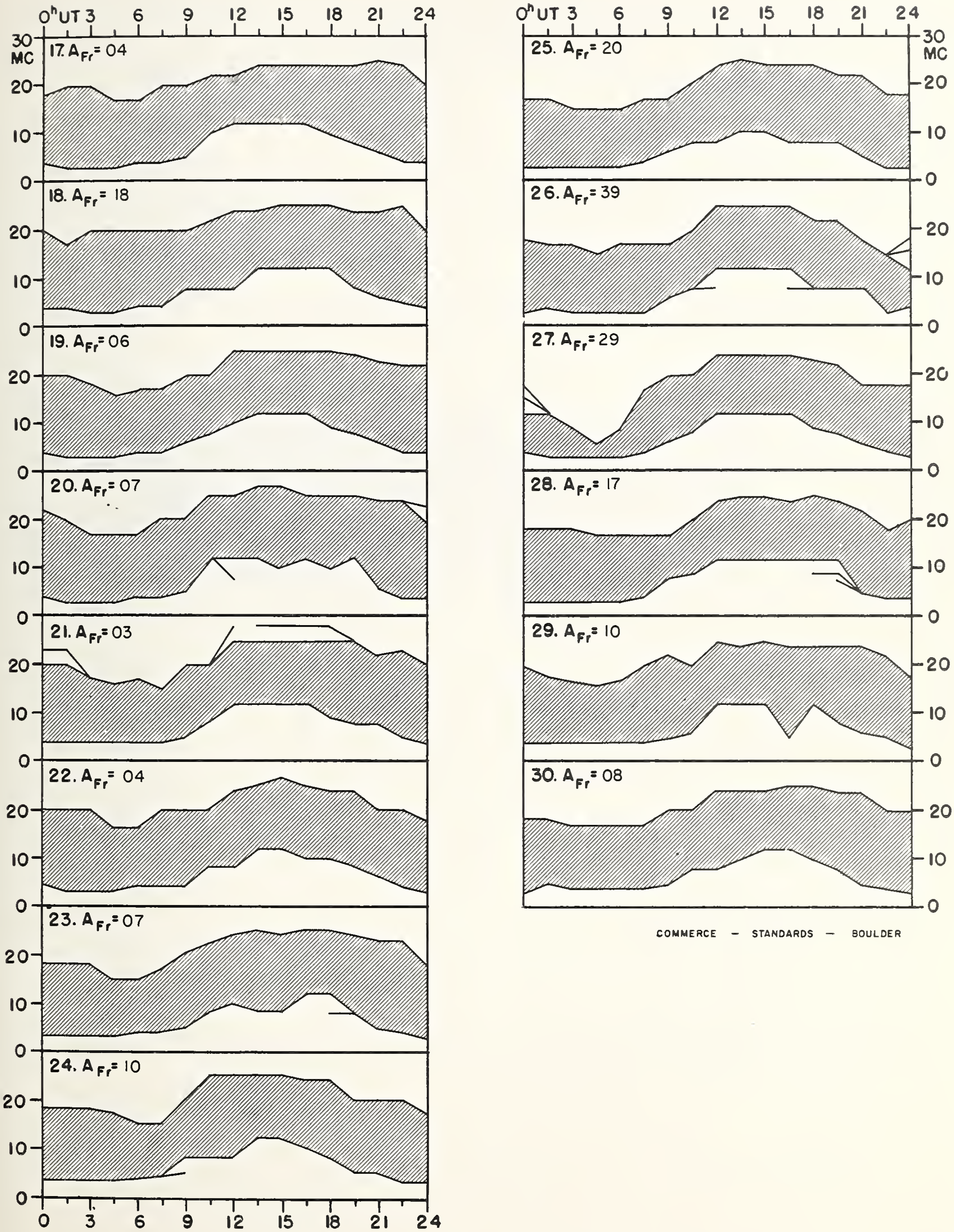
USEFUL FREQUENCY RANGES -- NORTH ATLANTIC PATH

NOVEMBER 1957



COMMERCE – STANDARDS – BOULDER

NOVEMBER 1957



COMMERCE — STANDARDS — BOULDER

Adapted from Observations by Deutsches Bundespost

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

NOVEMBER 1957

Nov. 1957	North Pacific 8-hourly quality figures			Short-term forecasts issued at			Whole day index	Advance forecasts (Jp reports) for whole day; issued in advance by:			Geomagnetic K_{Si}	
	03 to 11	11 to 19	19 to 03	02	10	18		1-4 days	4-7 days	8-25 days	Half (1)	Day (2)
1	6	6	7	7	6	6	7	6	7		2	2
2	7	7	6	7	7	7	7	7	6		1	2
3	7	6	7	6	5	7	7	7	6		3	(4)
4	6	7	7	6	6	6	7	7	6		0	0
5	6	6	7	7	6	6	6	7	6		0	0
6	6	7	6	7	6	6	6	6	7		0	3
7	6	6	7	6	5	6	6	6	7		(4)	3
8	7	6	6	6	5	6	6	6	7		(4)	(4)
9	6	6	6	6	6	6	6	6	6		(4)	(4)
10	6	6	6	6	6	6	6	6	6		(4)	(4)
11	6	6	6	6	6	6	6	6	6		(4)	3
12	6	6	6	6	6	6	6	6	6		3	3
13	6	7	7	6	7	6	7	6	7		2	3
14	6	6	7	7	7	7	6	6	7		3	(4)
15	6	7	7	6	6	6	6	6	7		(4)	2
16	6	6	7	7	6	6	7	6	6		2	2
17	6	6	7	6	6	6	7	6	6		0	1
18	6	5	7	6	6	6	6	6	6		(4)	(4)
19	7	6	7	6	6	6	7	6	6		2	2
20	6	6	6	7	6	6	6	6	6		1	2
21	6	6	6	6	6	6	7	6	6		0	1
22	6	6	6	6	6	6	6	7	6		0	1
23	6	6	6	6	6	6	6	6	7		1	2
24	7	7	7	7	7	6	7	6	7		2	2
25	6	6	7	6	5	6	6	6	7		(4)	(4)
26	6	6	6	5	6	4	6	6	7		(4)	(6)
27	4	5	6	5	4	6	5	5	6		(6)	(4)
28	5	5	6	6	5	6	6	5	6		(4)	(4)
29	6	6	6	5	5	6	6	6	6		2	2
30	7	6	7	6	6	6	7	6	6		2	2

Score:							
Quiet Periods	P	16	19	15	19	13	
	S	13	11	14	11	17	
	U	0	0	0	0	0	
	F	0	0	1	0	0	
Disturbed Periods	P	0	0	0	0	0	
	S	1	0	0	0	0	
	U	0	0	0	0	0	
	F	0	0	0	0	0	

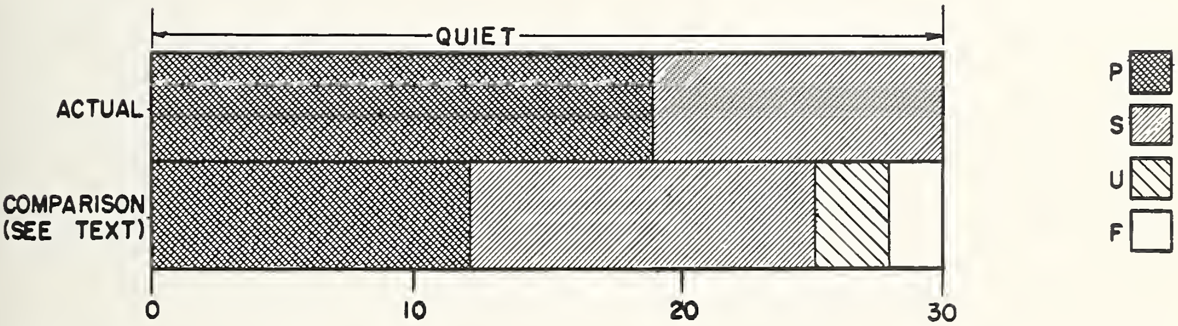
( ) represent disturbed values.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

NOVEMBER 1957

OUTCOME OF ADVANCED FORECASTS 1 TO 4 DAYS AHEAD



ALERT PERIODS AND SPECIAL WORLD INTERVALS

Alert Issued Ends 1600 UT 1600 UT	SWI	A_{Be} On Days of Alert Period (SWI Underlined)	Number of Flares of IMP$\geq$ 2 Reported Promptly on Days of Alert Period
1957			
Dec 15-Dec 21		15-08-16-09-17-15-09	0-1-2-2-1-3-1
Dec 26-Dec 29		13-05-05-05	0-2-1-0

COMMERCE - STANDARDS - BOULDER